GE Medical Systems

Technical Publication

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Revision 10
Precision RXi System Operator Manual

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Revision History

Rev.	Date.	Reason for Change
01	---	Draft release
02	---	M3 release
03	---	M4 first release
04	June 2005	M4 with integrations and corrections
05	July 2005	M4 with par. 4.1.2.1 and 13.1.9
06	February 2006	Equivalent filtration, PBL, 1k*1k, corrections
07	July 2006	Equivalent filtration, multiple AEC dose selection, corrections
08	October 2006	512 analogical TV chain, B&W monitor
09	April 2007	New Touch Screen 15", console joystick protection
10	November 2007	Intelligent tilting, 4th modality collimation, collimator with spectral filters, digital system with DVD, new monitor, new dual monitor chart.

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1. Introduction

Warning

THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS, OPERATING INSTRUCTIONS AND MAINTENANCE SCHEDULES ARE OBSERVED.

Although this equipment was designed and manufactured according to the most up-to-date safety Standards, the X-ray beam always represents a danger, should the operator not be properly qualified and trained.

Excessive exposures to X-rays cause damage to the human body; therefore all the necessary precautions must be taken to prevent unauthorized or unskilled personnel from operating this equipment, thus jeopardizing themselves and others.

Before executing any operation, the person being qualified and authorized to operate this equipment must be informed about the protection and safety measures established by the International Committee for the Radiological Protection, as well as any other relevant national Standards.

For a proper use of this equipment, it is required that the operator should previously and carefully refer to the present User's manual.
A special attention should be paid to the sections "Safety Recommendations", "Protection Measures", "Functioning and Safety Controls".

Note:
This equipment is in compliance with the requirements established by the European Directive 93/42 CEE applying to medical devices, thus it is provided with the CE mark stating the code number identifying the notified body responsible for carrying out the procedures foreseen for the compliance certification.

CE 0051

The Manufacturer: General Medical Merate via Partigiani, 25 – 24068 Seriate (BG) Italy.
E-mail info@gmmspa.com Tel. (+39) 035 4525311

The original document was drawn up in Italian.

The Manufacturer (GMM) and the Distributor (GE Medical Systems) shall decline all responsibility with regard to the proper functioning of the equipment should the installation and/or the maintenance of it be executed by unauthorized personnel.

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1.1. About this manual

This manual is intended to assist the users and operators in the safe and effective operation of the equipment described.
Do not operate the equipment until this manual has been carefully read and understood.
Keep this operator's manual with the equipment at all times, and periodically review the operating and safety instructions.

Please pay particular attention to NOTES, CAUTIONS AND WARNINGS.

WARNING: Statements are important and if not followed could cause fatal or serious injury to the operator, patient or any other person near the equipment or could result in misdiagnosis. Warnings are critical to proper operation of the system within regulatory guidelines.

CAUTION: Follow the directions written in this manual carefully. If these directions are not followed this could cause danger to the operator, patient or any other person near the equipment, loss of patient data or could cause damage to the equipment

NOTE: This message requires specific attention but the contents do not include any risk of injuries to the patient or the user or to damaging the equipment.

Operate this equipment with careful consideration of all safety precautions and warnings given in this manual for the purposes for which it was designed. Incorrect use or operation of the equipment releases the manufacturer from any responsibility in case of non-compliance, damage or injury.

Do not make any changes in the configuration of the equipment if you have not received appropriate training. Do not use other spare parts than those recommended by manufacturer or his agent.

Do not operate the GE Precision RXi system except in accordance with information included in this manual, and any additional information provided by the system manufacturer and/or competent safety authorities.

Do not use the equipment if you have not received appropriate training in the correct and safe use of the equipment by manufacturer or any of him appointed instructor. Never allow unqualified personnel to operate the system.

This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed.

DO NOT operate this system if there is any uncertainty as to the proper functioning of the system.

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1.2. Applicable standards

1.2.1. Waste of materials

WEEE/RoHS = Waste Electrical and Electronic Equipment / Restriction of Hazardous Substances.

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

1.2.2. Safety

The Precision RXi remote R&F system comply with the following regulatory requirements and design standards:

- EC Directive 93/42/EEC concerning Medical Devices (European Community).
- FDA Center for Devices & Radiological Health (CDRH) - 21 CFR title 21 subchapter J (USA).
- EN 60601-1/IEC 60601-1; EN 60601-1-3/IEC60601-1-3 ; EN 60601-2-7/IEC60601-2-7; EN 60601-2-32/IEC60601-2-32
- CSA 601.1 ; UL2601.1

- Type of protection against electric shock: Class I equipment.
- Degree of protection against electric shock: Type B.
- Degree of protection against harmful ingress of water: Ordinary equipment.
- Mode of operation: Continuous operation with intermittent loading (standby - exposure).
- Equipment not suitable for use in presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

***NOTE**:*
All referenced standards are considered to be at the latest adopted revision

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1.2.3. EMC (IEC 60601-1-2:2001/ EN 60601-1-2:2001 / CEI EN 60601-1-2:2003)

GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

The PRECISION RXi remote R&F system is suitable for use in the specified electromagnetic environment.
This declaration is based on the single declarations of the manufacturers of the Positioner (GMM SpA), X-Ray generator (CPI Inc.) and Digital Imaging System (INFIMED Inc.) and related EMC report as described below:

Device	Manufacturer	Model	EMC Report	Laboratory
X-ray remote Table	GMM SpA	Precision RXi-T (T90EX)	80SG00508/1 /2	IMQ

Note: The Precision RXi positioner when standalone is identified by GMM as the T90EX

The **Precision Rxi and Precision Rxi version e** are suitable for use in the specified electromagnetic environment. The purchaser or user of the **Precision Rxi and Precision Rxi version e** should assure that it is used in an electromagnetic environment as described below:

Emissions test	Compliance	Electromagnetic Environment
Radiated and conducted RF emissions CISPR 11	Class A	This **Precision Rxi and Precision Rxi version e** is suitable for use in all establishments other than domestic and those directly connected to the low voltage power supply network which supplies buildings used for domestic purposes
	Group 1	This **Precision Rxi and Precision Rxi version e** uses RF energy only for its internal function. Therefore, the RF emission is very low and not likely to cause any interference in nearby electronic equipment.
Harmonic emissions EN 61000-3-2	not applicable	This **Precision Rxi and Precision Rxi version e** is suitable for use in establishments not directly connected to a public low voltage power supply network.
Voltage fluctuations/ flicker emissions EN 61000-3-3	not applicable	This **Precision Rxi and Precision Rxi version e** is suitable for use in establishments not directly connected to a public low voltage power supply network.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

The **Precision Rxi and Precision Rxi version e** is suitable for use in the specified electromagnetic environment. The purchaser or user of the **Precision Rxi and Precision Rxi version e** should assure that it is used in an electromagnetic environment as described below:

Immunity Test	**EN 60601-1-2 Test level**	**Compliance level**	**Electromagnetic Environment**
Electrostatic discharge (ESD) EN 61000-4-2	6 kV contact 8 kV air	EN 60601-1-2 Test level	Hospital
Radiated RF EN 61000-4-3	Non-life-supporting equipment 3 V/m 80 MHz to 2.5 GHz Life-supporting equipment 10 V/m 80 MHz to 2.5 GHz	EN 60601-1-2 Test level EN 60601-1-2 Test level	Hospital
Conducted RF EN 61000-4-6	Non-life-supporting equipment 3 V 150 kHz to 80 MHz Life-supporting equipment 3 V outside ISM band 10 V inside ISM band	EN 60601-1-2 Test level	
Electrical fast transient/burst EN 61000-4-4	2 kV for power supply lines 1 kV for input/output lines > 3 m	EN 60601-1-2 Test level	Hospital
Surge EN 61000-4-5	1 kV differential mode 2 kV common mode	EN 60601-1-2 Test level	Hospital
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	0 % Un for 5 s	EN 60601-1-2 Test level	Hospital
Power frequency (50/60 Hz) magnetic field EN 61000-4-8	3 A/m	EN 60601-1-2 Test level	Hospital

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Recommended Separation Distance for non-LIFE SUPPORTING EQUIPMENT

RF Source	Typical Rated Power (W)	Distance (m)
microcellular phone CT1, CT2, CT3	0.01	0.4
DECT cellular phone, wireless information technology equipment (modems, LANs)	0.25	2
cellular phone, hand-held (USA)	0.6	3
cellular phone, hand-held (e.g. GSM and NMT, Europe; DECS 1800)	2 8	6 11
walkie-talkie (rescue, police, fire, maintenance)	5	9
cellular phone, bag	16	16
mobile radio (rescue, police, fire)	100	40

For transmitters using frequencies below 800 MHz, the DISTANCE can be estimated using Equation A:

$$d = 4\sqrt{P}$$

For transmitters using frequencies between 800 MHz and 2.5 GHz, the DISTANCE can be estimated using Equation B:

$$d = 2.3\sqrt{P}$$

where P is the rated power of the transmitter in watt (W) according to the transmitter manufacturer.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

The PRECISION RXi remote R&F system is suitable for use in the specified electromagnetic environment.
This declaration is based on the single declarations of the manufacturers of the Positioner (GMM SpA), X-Ray generator (CPI Inc.) and Digital Imaging System (INFIMED Inc.) and related EMC report as described below:

Device	Manufacturer	Model	EMC Report	Laboratory
X-ray generator	C.P.I. Inc.	Precision RXi-G (VZW2930)	CPI064-EN1-2	Ultratech

Note: The Precision RXi X-ray generator is part of CPI VZW2930 series

Guidance and manufacturer's declaration – electromagnetic emissions

The VZW2930 series of X-ray generators are intended for use in the electromagnetic environment specified below. The customer or the user of the VZW2930 series should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The VZW2930 series of X-ray generators use RF energy only for their internal functions. Therefore, the RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A (The VZW2930 series of X-ray generators in combination with shielded location)	The VZW2930 series of X-ray generators must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that exits the shielded location, a minimum RF filter attenuation of 40dB from 30 MHz to 230 MHz and 47dB from 230 MHz to 1 GHz. (The minimum at 30 MHz is 40dB and the minimum at 230 MHz is 47dB). The VZW2930 series is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not Applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not Applicable	

NOTE It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specifications.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and manufacturer's declaration – electromagnetic immunity

The VZW2930 series of X-ray generators are intended for use in the electromagnetic environment specified below. The customer or the user of the VZW2930 series should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruption, and voltage variations on power supply input lines IEC 60601-4-11	< 5 % U_T (> 95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) < 5 % U_T (> 95 % dip in U_T) for 5 s	< 5 % U_T (> 95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) < 5 % U_T (> 95 % dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the VZW2930 series X-ray generator requires continued operation during power mains interruptions, it is recommended that the X-ray generator be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment

NOTE: U_T is the A.C. mains voltage prior to application of the test level.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and manufacturer's declaration – electromagnetic immunity

The VZW2930 series of X-ray generators is intended for use in the electromagnetic environment specified below. The customer or the user of the VZW2930 series should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80MHz	3 V_{rms} 150 kHz to 80MHz	The VZW2930 series of X-ray generators must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location, a minimum RF filter attenuation of 40dB from 30 MHz to 230 MHz and 47dB from 230 MHz to 1 GHz. (The minimum at 30 MHz is 40dB and the minimum at 230 MHz is 47dB.)
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2.5 GHz	3 V/m 80MHz to 2.5 GHz	Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3 V/m.[a] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1 These guidelines may not apply all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

NOTE 2 It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the VZW2930 series of X-ray generators is used exceeds the applicable RF compliance level above, the X-ray generator should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the X-ray generator.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and manufacturer's declaration – electromagnetic emissions

The touch screen console is intended for use in the electromagnetic environment specified below. The customer or the user of the touch screen console should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The touch screen console uses RF energy only for their internal functions. Therefore, the RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	Not Applicable
Harmonic emissions IEC 61000-3-2	Not Applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not Applicable	

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and manufacturer's declaration – electromagnetic immunity

The touch screen console is intended for use in the electromagnetic environment specified below. The customer or the user of the touch screen console should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruption, and voltage variations on power supply input lines IEC 61000-4-11	< 5 % U_T (> 95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) < 5 % U_T (> 95 % dip in U_T) for 5 s	< 5 % U_T (> 95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) < 5 % U_T (> 95 % dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the VZW2930 series X-ray generator requires continued operation during power mains interruptions, it is recommended that the X-ray generator be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment

NOTE: U_T is the A.C. mains voltage prior to application of the test level.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and manufacturer's declaration – electromagnetic immunity

The touch screen console is intended for use in the electromagnetic environment specified below. The customer or the user of the touch screen console should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80MHz	3 V_{rms} 150 kHz to 80MHz	Interference may occur in the vicinity of equipment marked with the following symbol:
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2.5 GHz	3 V/m 80MHz to 2.5 GHz	

NOTE 1 These guidelines may not apply all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

NOTE 2 It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

The PRECISION RXi remote R&F system is suitable for use in the specified electromagnetic environment.
This declaration is based on the single declarations of the manufacturers of Positioner (GMM SpA), X-Ray generator (CPI Inc.) and Digital Imaging System (INFIMED Inc.) and related EMC report as described below:

Device	Manufacturer	Model	EMC Report	Laboratory
Digital Imaging System	Infimed Inc.	Precision RXi-D	3107751BOX-001A	Intertek ETL SEMKO

Note: The Precision RXi-D is identified by Infimed as the PLATINUM ONE with the LARGE Format Camera.

Guidance and Manufacturer's Declaration
EMISSIONS – All Equipment and Systems

This ***System*** with ***a LARGE Format Camera*** is intended for use in the electromagnetic environment specified below. The customer or user of this ***System*** with a ***LARGE Format Camera*** should ensure that it is used in such an environment.

EMISSIONS Test	Compliance	Electromagnetic Environment – Guidance
RF Emissions CISPR 11	**Class A, Group 1**	This ***System*** with a ***LARGE Format Camera*** uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Harmonics IEC 6100-3-2	**Class A**	This ***System*** with ***LARGE Format Camera*** is suitable for use in all establishments, other than domestic, and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Flicker IEC 61000-3-3	**Complies**	

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and Manufacturer's Declaration
IMMUNITY – All Equipment and Systems

This ***System*** with ***LARGE Format Camera*** is intended for use in the electromagnetic environment specified below. The customer or user of this ***System*** with a ***LARGE Format Camera*** should ensure that it is used in such an environment.

IMMUNITY Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
EDS IEC61000-4-2	± 6KV Contact ± 8KV Air	± 6KV Contact ± 8KV Air	Floors should be wood, concrete or ceramic tile. If floors are synthetic, the r/h should be at least 30%.
EFT IEC61000-4-4	± 2KV Mains ± 1KV I/Os	± 2KV Mains ± 0.5KV I/Os	*Equipment Under Test (EUT)* passes with a reduced compliance level. Degradation was noted and communications lost between mouse and PC, but was regained once the test disturbance was removed. Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	± 1KV Differential ± 2KV Common	± 1KV Differential ± 2KV Common	Mains power quality should be that of a typical commercial or hospital environment.
Voltage Dips / Dropout IEC61000-4-11	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles >95% Dip for 5 Seconds	>95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles >95% Dip for 5 Seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of this ***System*** with ***LARGE Format Camera*** requires continued operation during power mains interruptions, it is recommended that this ***System*** with ***LARGE Format Camera*** be powered from an uninterruptible power supply or battery.
Power Frequency 50/60Hz Magnetic Field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be that of a typical commercial or hospital environment.

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Guidance and Manufacturer's Declaration
EMISSIONS – All Equipment and Systems, NOT LIFE-SUPPORTING

This ***System*** with ***LARGE Format Camera*** is intended for use in the electromagnetic environment specified below. The customer or user of this ***System*** with a ***LARGE Format Camera*** should ensure that it is used in such an environment.

IMMUNITY Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	**Portable and mobile communications equipment should be separated from this *System* with a *LARGE Format Camera* by no less than the distances calculated / listed below:** **D =** (3.5/V1)(Sqrt P) **D =** (3.5/E1)(Sqrt P) 80 to 800 MHz **D =** (7/E1)(Sqrt P) 800 to 2.5 GHz ... where **P** is the max power in watts and **D** is the recommended separation distance in meters. Field strengths from fixed transmitters, as determined by an electromagnetic site survey, should be less than the compliance levels (V1 and E1). Interference may occur in the vicinity of equipment containing a transmitter.
Radiated RF IEC 61000-4-3	3 Vrms 80 kHz to 2.5 MHz	3 Vrms	

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GUIDANCE AND MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSION

Recommended SEPARATION DISTANCES – Between Portable and Mobile RF Communications Equipment and this *System* with a *LARGE Format Camera*. Equipment and Systems that are NOT LIFE-SUPPORTING

This ***System*** with ***LARGE Format Camera*** is intended for use in the electromagnetic environment in which radiated disturbances are controlled.

The customer or user of this ***System*** with a ***LARGE Format Camera*** can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF Communications Equipment and the <<model>> as recommended below, according to the maximum output power of the communications equipment.

MAX Output Power (Watts)	**Separation (m) 150kHz to 80MHz** D=(3.5/E1)(Sqrt P)	**Separation (m) 80 to 800MHz** D=(3.5/E1)(Sqrt P)	**Separation (m) 800MHz to 2.5GHz** D=(7/E1)(Sqrt P)
0.01	.1166	.1166	.2333
0.1	.3689	.3689	.7378
1	1.1666	1.1666	2.3333
10	3.6893	3.6893	7.3786
100	11.6666	11.6666	23.3333

1.2.4. Electromagnetic compatibility (EMC)

In accordance with the intended use, this R&F remote system complies with the European Council Directive concerning MedicaI Devices. The CE marking affixed to this product signifies this. One of the harmonized standards of this Directive defines the permitted levels of electromagnetic emission from this equipment and its required immunity from the electromagnetic emissions of other devices.
It is not possible, however, to exclude with absolute certainty the possibility that other high frequency electronic equipment, which is fully compliant to the EMC regulations, will not adversely affect the operation of this system. If the other equipment has a comparatively high level of transmission power and is in close proximity to the system, these EMC concerns (the risk of interference) may be more pronounced. It is therefore recommended that the operation of equipment of this type such as mobile telephones, cordless microphones and other similar mobile radio equipment be restricted from the vicinity of this R&F remote system.

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1.3. Intended use of GE Precision RXI Examination Room

GE Precision RXi is a X-ray system intended for a multitude of diagnostic procedures:

- Esophagram (Barium swallow)
- Standard Barium Enema (BE)
- Standard Upper GI
- Small Bowel
- Cholangiogram
- Myelogram

- Examination of Skull, Sinuses, and Face (Blondeau or Hirtz projection)
- Examination of Cervical Spine
- Examination of Dorsal Spine and Lumbar Spine
- Examination of Sacro-lumbal hinge-joint
- Examination of Shoulder
- Examination of Pelvis and Hips
- Examination of Knee (under load)
- Examination of Foot (under load)
- Examination of Thorax
- Examination of Thorax on Wall Bucky
- Lung Tomography
- Larynx Tomography

- Skull Tomography
- Knee Arthrography
- Hysterography
- Urography

- Esophagus Examination
- Stomach Examination
- Gall Bladder Examination
- Phlebography
- Myelography

- Examinations on a Patient Trolley

- Femoral Angiography
- Precision RXi shall provide Digital Subtraction Angiography capability

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2. Safety

It is the installer and/or operator's responsibility to observe all the governmental obligations and regulations in force applying to the installation and/or use of this equipment.
All the parts of this product must be checked and inspected at least every 12 months in order to ensure the proper working of the product as well as the necessary safety for patients, personnel and third parties.
Additional checks and inspections should be carried out more often if the product is meant for working more hard than the standard average use.
Please contact GE Medical System's Service Department or authorized distributors for executing the system inspection.
Every 12 months the servicing technicians should inspect the unit and, if necessary, replace the components that could involve situations of danger due to wear.
These inspections should be foreseen within the annual maintenance program executed by GE Medical System's Service Department. Should possible national standards require more inspections or checks, please make sure that these are carried out.
Before any control, the operating personnel must make sure that all the signaling and safety devices work properly and the equipment is properly set for the use; particularly, the visual inspection of all displays and LEDs must be executed in order to check the relevant functioning (visual inspection).
The lamp signaling the X-ray exposure should light on only after the command for exposure is activated and keep lit on only for the time strictly required by the X-ray or radioscopic exposure. Should this lamp lights on when no exposure command was given, you shall immediately switch off the generator and call GE Medical System's Service Department.
Any modification or implementation of the system must be carried out in compliance with the national and international standards and regulations.
The Manufacturer (GMM) and the Distributor (GE Medical Systems) of this product can not be held responsible with regard to the equipment safety, performance, efficiency if:

- the installation, implementation, resetting, modifications, fixings are executed by unqualified personnel and/or personnel not authorized by GE Medical System's Service Department;
- components being important for the safety of the product are not replaced by original spare parts by GE Medical System;
- the electrical cabling inside the rooms where the system is to be installed is not in compliance with the specifications established by IEC 364 series Standards or relevant national standards;
- the system is used in a different manner compared with the specifications stated in the manual applying to its use.

GE Medical System is not responsible for repairs executed by technical personnel outside GE Medical System's Servicing Organization without a specific written consent.

For each technical intervention executed by our Service Department's personnel, we suggest you should request for a copy of the relevant Testing Minutes where the following is always specified: kind of the intervention executed, modifications of the rated parameters or value range, date, name, signature of the technician who carried out the intervention.

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2.1. Safety and warning symbols

Hazard symbol to advise of X-ray radiation exposition

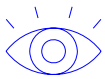
Warning symbol to advise when a possible general danger for the equipment or the operator may occur.
Invite the operator to check the equipment documentations

Warning symbol to advise for electrical components that are sensitive to electrostatic discharge

Warning symbol to advise of possible fingers squashing.

Warning symbol to advise of live electrical parts with a possible risk of electric shock

Warning symbol for not laying on the control panel console any kind of stuff !



Fluoro radiation exposure symbol used on the touch screen and on optional remote fluoro control unit. Illuminates to indicate that a fluoro exposure is in progress. This is accompanied by an audible tone from the console

2.2. Before switching on the system

Before switching on the equipment, the operator shall verify:

- dangerous areas on the equipment, where possible risks may exist with reference to crashes or crushing;
- dangerous areas on the equipment where the patient or the operator may get injured;
- dangerous movements that may determine a damage to the equipment.

WARNING:
It is the operator's responsibility to command movements of the equipment only after making sure that these do not involve any risks of damage to the patient or third parties.

The equipment can be used only under control of authorized staff. In case authorized staff must leave the exam room, we suggest switching off the equipment to avoid unauthorized use.

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2.3. Emergency procedures

2.3.1. Emergency Stop push-button

If due to improper functioning of the equipment an emergency occurs causing possible risks of danger to the patient or the operator, the equipment's functioning can be stopped immediately by pressing the **EMERGENCY STOP push-button.**

The emergency stop push-button is red so as to ensure an easy and immediate identification.
If you press this push-button all the controls of the equipments will be deactivated immediately and all the movements will be stopped.

ATTENTION:
The EMERGENCY STOP push-button should be released (by pulling it) only after identifying and eliminating the problem that determined the emergency situation.

Should the foreseen stop not be activated, you shall press the **GENERAL EMERGENCY STOP** push-button that is provided for stopping the electrical supply to the whole installation.
In this case, the equipment must not be reactivated and GE Medical System's Service Department must be informed immediately.

2.3.2. General Emergency Stop-push-button

The electrical installation provided by the customer must provide for one or more **GENERAL EMERGENCY STOP** circuit-breakers, for the following reason:

- in case of dangerous situations for the patient, the operator or the equipment: you shall press the nearest general emergency stop push-button; the electrical supply of the installation will be stopped immediately as well as any movements or functions of the equipment.

The **GENERAL EMERGENCY STOP** push-button can be released (normally by pulling it or turning it clockwise) only if the situation that caused the danger are clearly identified and eliminated; in all cases, especially when a improper functioning of the equipment is noted, you are kindly requested to inform GE Medical System's Service Department or the Service Department of GE Medical System's authorized Distributor.

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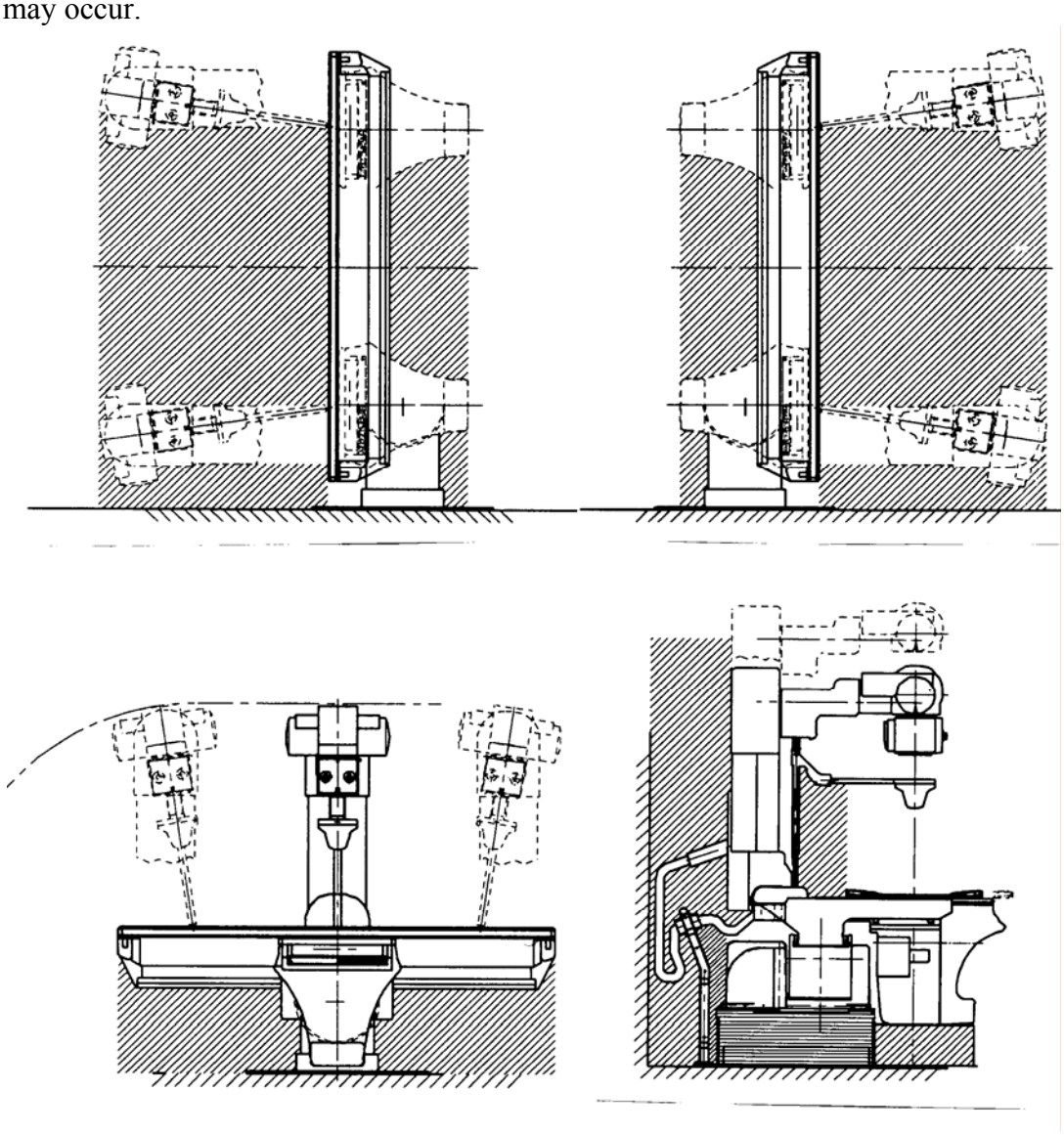
2.4. Mechanical safety

2.4.1. Dangerous areas

The dashed areas indicated on the drawings show the areas within which possible risks of crash or crushing may occur.



Danger of crash:

In these areas a risk of crash exists during the movement with stretchers, beds, chairs, mobile table with medical instruments, baskets, stands, etc.

- Therefore, you shall verify that the relevant area is free from any obstacles before commanding any movements of the equipment.

Danger of crushing

In these areas a possible danger of crushing exists for the operator, the patient or third parties when a movement of the equipment is commanded:

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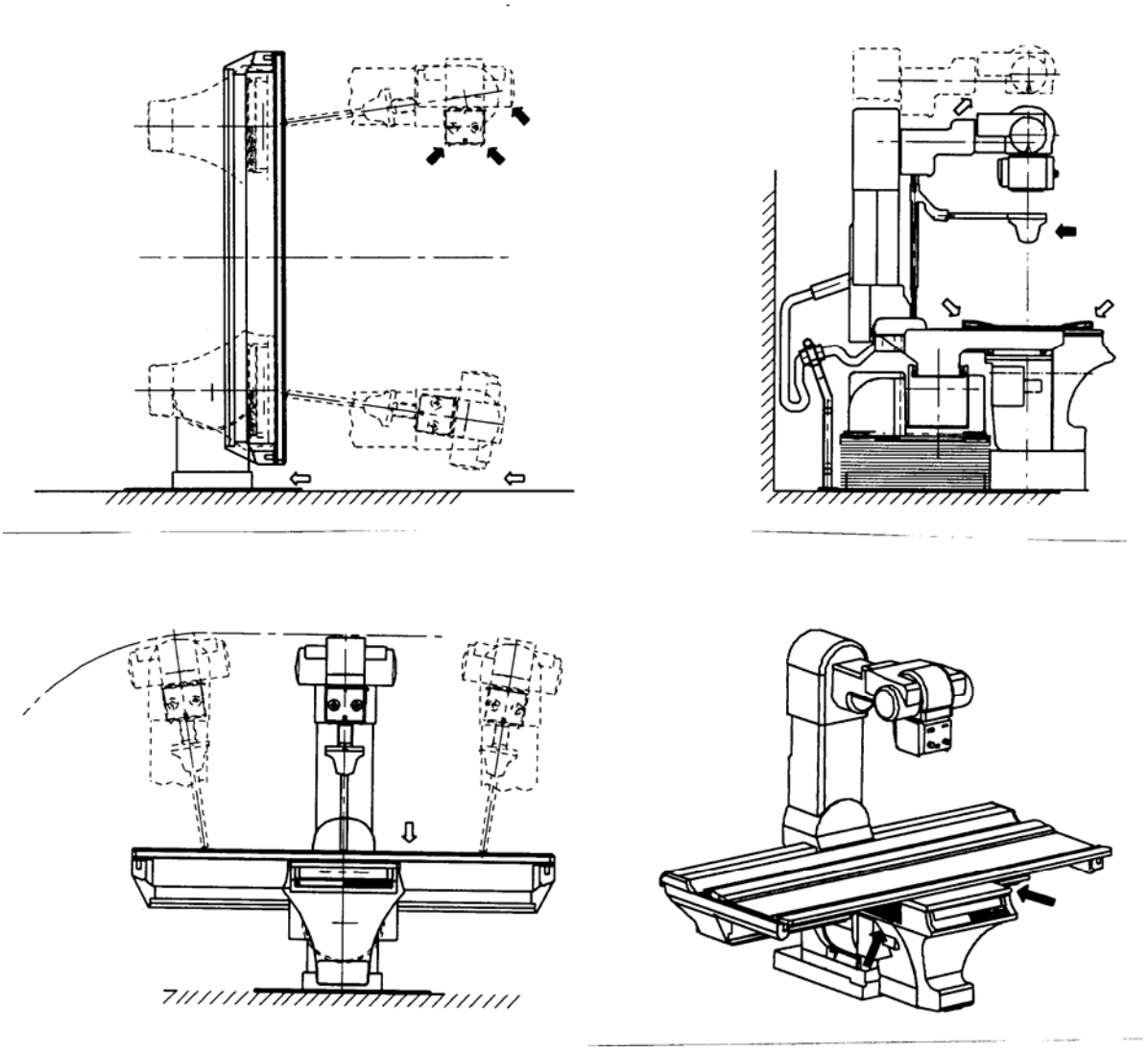
- Before commanding any movements, you shall verify that nobody else but the patient is present within the area and that the patient is properly secured on the tabletop as described here below.
- While commanding the equipment, you shall avoid, if possible, to stand next to the equipment itself, as well as remain in a seat working position directly on the equipment.
- Pay your best attention to a possible crushing of your feet during the equipment's tilting.

The following pages must be read carefully in order to avoid other possible problems with dangerous areas related to the equipment.

2.4.2. Dangerous Point



The arrows marked on the drawings indicate possible dangerous points as follows: white arrows: crushing; black arrows: crash.

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Dangerous points for the hold:
The white arrows indicate the points where a possible crushing of the patient/operator's feet and hands may occur.

WARNING:
In no case these points must be used as a hold or grip.

ATTENTION:
During the movements of the equipment or the patient positioning, it is only and exclusively allowed to grasp the points provided for the relevant purpose.

Allowed hold points:
The following is foreseen:
- 1 pair of handgrips (standard supply) that are detailed in Paragraph 15 (Use of the Accessories).
- Make sure that these handgrips are always mounted.

In case the handgrips can not be used, you shall:
- Make sure to avoid any possibility of crushing with mobile parts or other objects.
- Make sure, during the examination, that in no case the patient holds on to the edge of the tabletop.

Dangerous crash points
The dark arrows indicated in the drawings show the points where the patient may crash against.

Crushing your fingers

ATTENTION:
*In order to avoid **crushing your fingers,** please make sure you carefully follow the procedure for inserting the X-ray cassette (paragraphs **4.4.9.1** and **4.8.9**).*

Table cassette-holder

Wall Stand cassette-holder

Patient positioning
The patient's arms, legs, hair must not overhang the tabletop.
Please make reference to paragraph 15 (Use of the Accessories).

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2.4.3. Measures to be taken to avoid damages to things

- Before commanding any movements, make sure that no obstacle is present within the movement area.

The dangerous areas of your equipment have already been indicated as “areas of crash”.

- No object or expendable supplies must be placed on the tabletop, the SFD or the bars.

As a matter of fact, during the movements of the SFD or the tabletop, these could crush such objects.

- Do not place any objects on any other surface;

In case of tilting, these objects could fall, thus involving possible damages.

- Do not climb up any point of the tabletop cover or the SFD.

The covers could get damaged and cause failures or bad functions of the equipment.

- Do not seat on the column or the stand-support when the equipment is in the vertical position.

This is prohibited since such a weight could determine damages to the material.

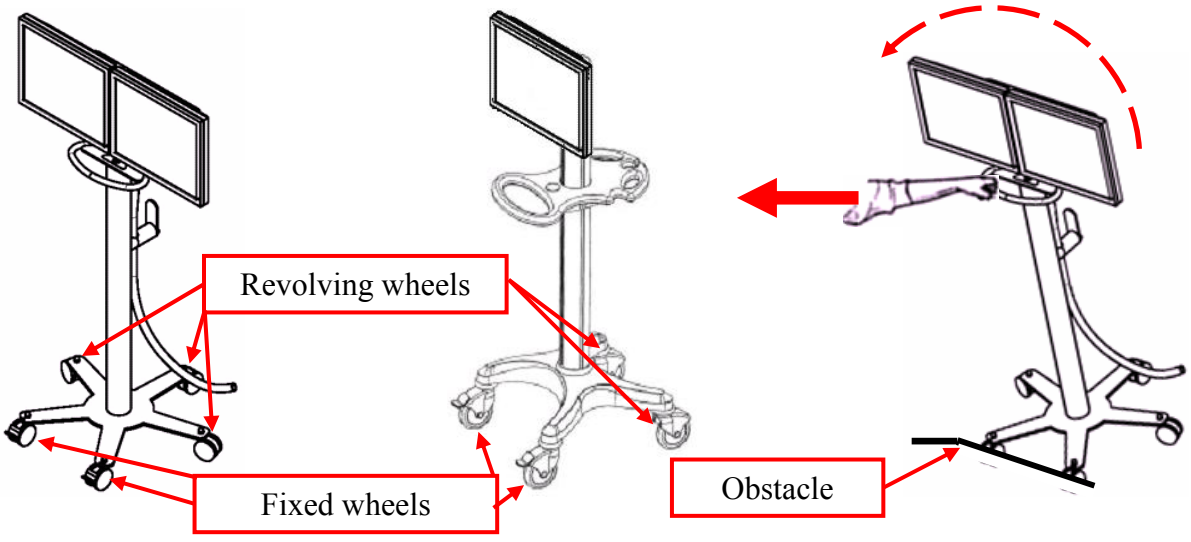
- In no case you shall put glasses for contrast liquids (or other objects) on the equipment, the cabinet or the control panel.

The contrast liquid could penetrate inside some components of the equipment causing damages to the equipment itself or wrong interpretations of the films.

We suggest you should immediately eliminate possible liquid stains. Before the examination, execute a check panoramic without object with the largest possible size.

2.4.4. Measures to be taken to avoid monitor cart tilting

The monitor cart is provided with two or three revolving wheels and two fixed wheels. These two ones can be blocked by means of levers.
To avoid monitor cart tilting it is important not to push it with force when wheels are fixed or in case of obstacles to be overcome on the floor such as boards or steps.



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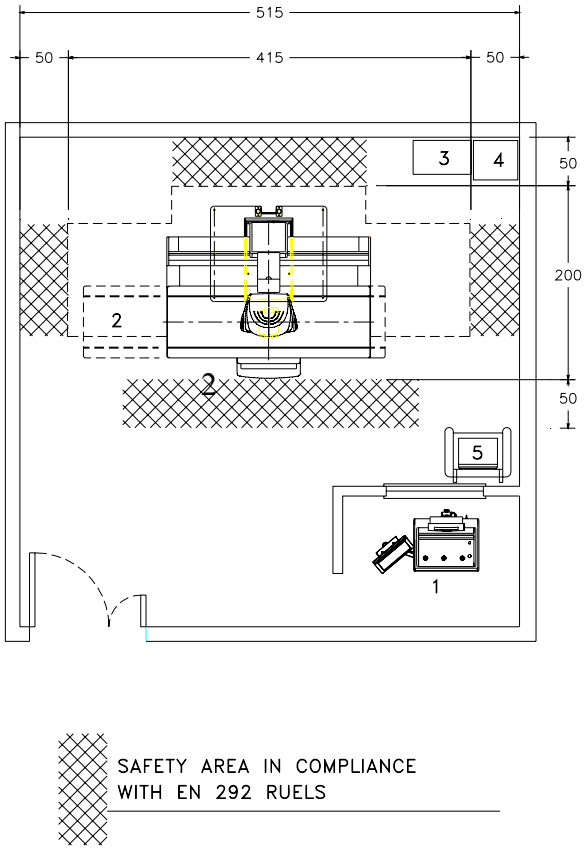
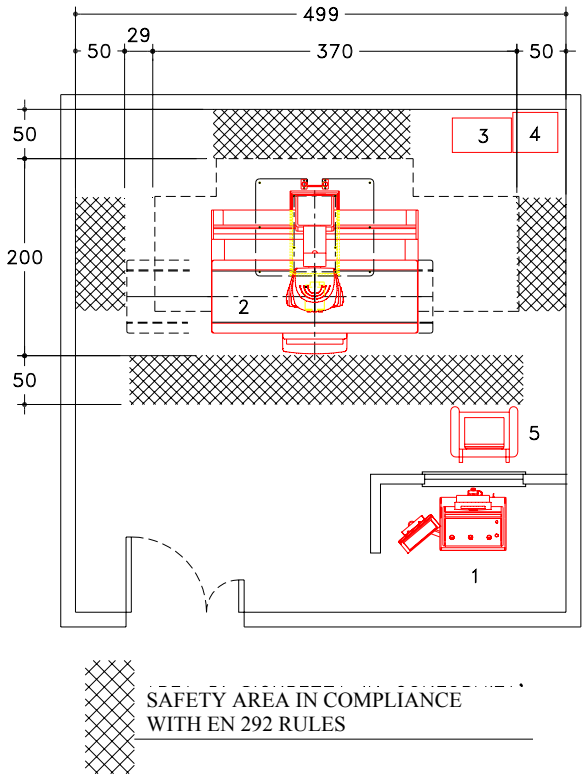
2.4.5. Safety areas



elevating table



not elevating table

1) Integrated console
2) Remote-controlled table
3) Power cabinet for positioner
4) Power cabinet for generator
5) Exam room monitor

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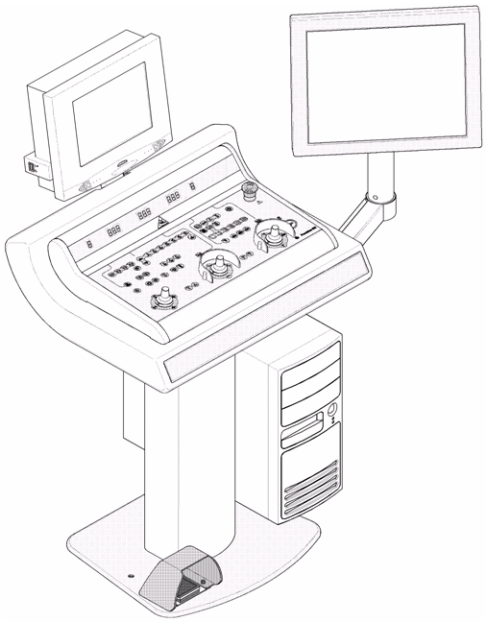
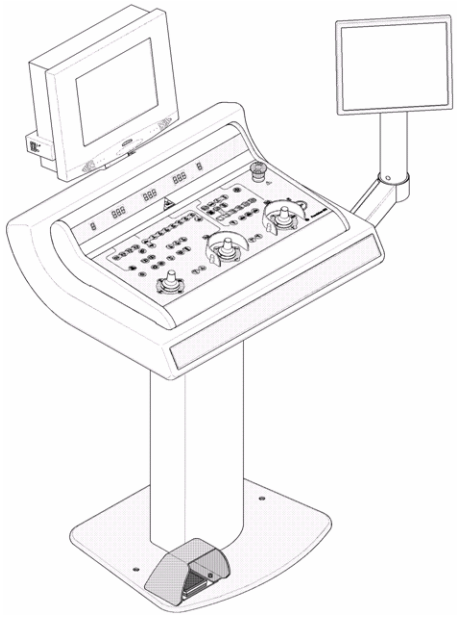
2.4.6. Console joystick protection

In order to avoid possible unwanted positioner movements that could turn out dangerous for the patient, the Precision RXi control panel console has been modified, please make reference to the following paragraph.

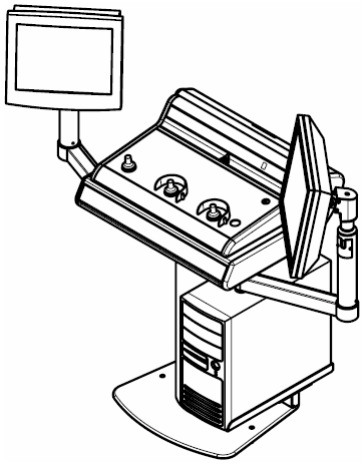
Some mechanical protections have been assembled near the joysticks and a Warning label was stuck

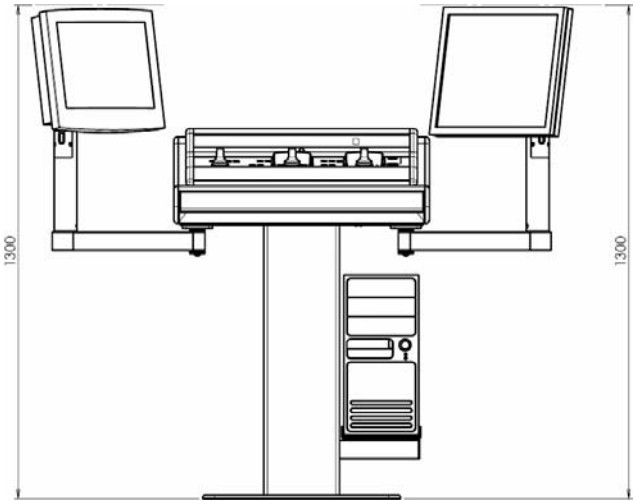


Digital version console



Analogical version console





Optional console version

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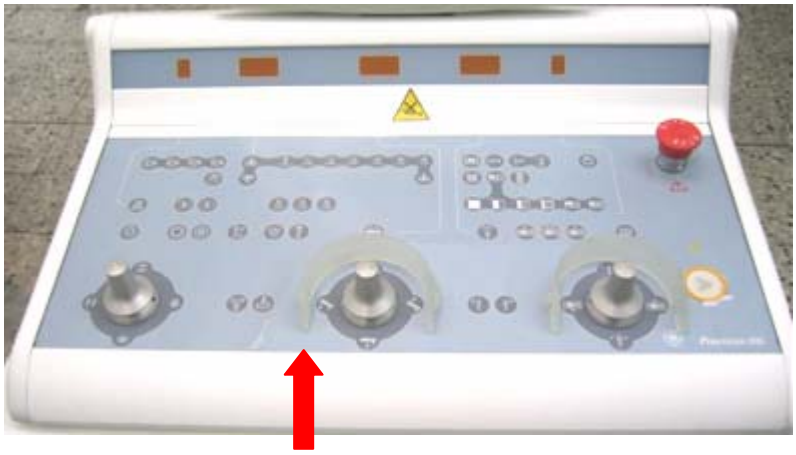
The label has the below meaning:

WARNING:

Do not leave any object on the control panel console !



Protections in order to avoid accidental control panel joystick movements.

2.5. Protection against radiation

Although the automatic collimation system considerably reduces the exposure of the patient to X-ray, the following recommendations must be followed:

- You shall collimate the radiated field to the minimum possible value.
- You shall provide the patient with the best possible protection by using specific screens in leaded rubber (in compliance with the requirements established by IEC 61331-3), if exposures are to be executed next to the patient's genital organs.
- If it is necessary the presence of a doctor or auxiliary personal near the patient during the X-ray exams, they must wear the specific protective garments (lead aprons, gloves/mittens, collar etc.) in compliance with the requirements established by IEC 61331-3.
- If it is necessary the presence of a doctor or auxiliary personal near the patient during the X-ray exams, they must occupy only the Significant zone of occupancy shown in Figure 1-2-3 In figures 1 2 and 3 are indicated the X ray radiations value measured in the Significant zone of occupancy and related to Fluoroscopy modality. These values measured on some tables as a sample, are useful to determine the individual protection that must be used, against radiations.
- You shall wear your personal control badge and, if necessary, a pen dosimeter.
- You shall keep a proper distance compared with the X-ray beam: the exposure should be commanded from the control panel which is normally placed behind the anti-X protection wall; in this way the necessary distance to ensure an adequate protection is automatically respected.

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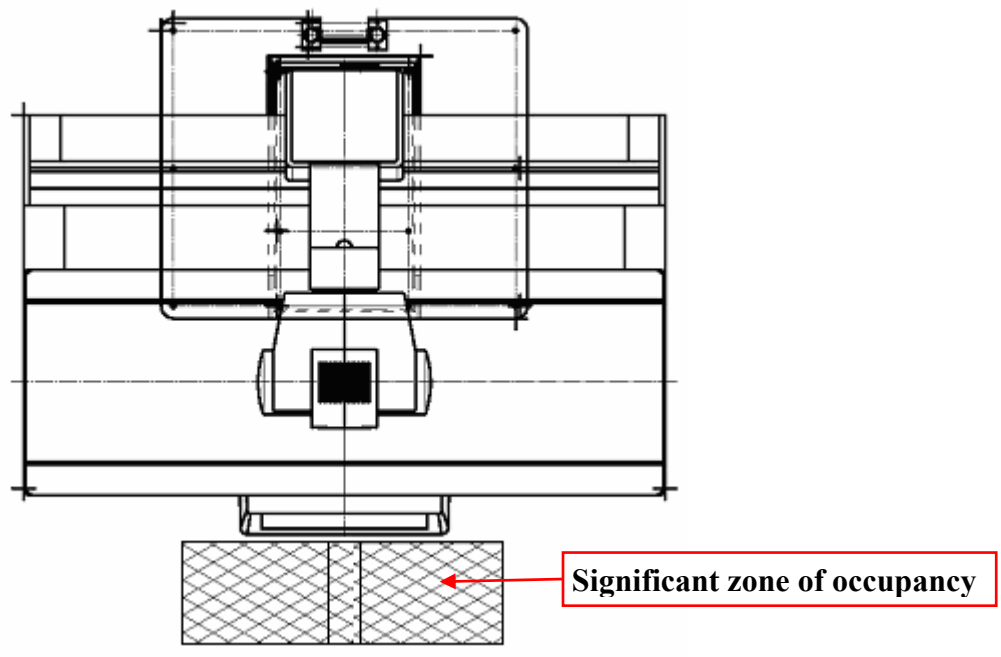

Figure1: Significant zone of occupancy

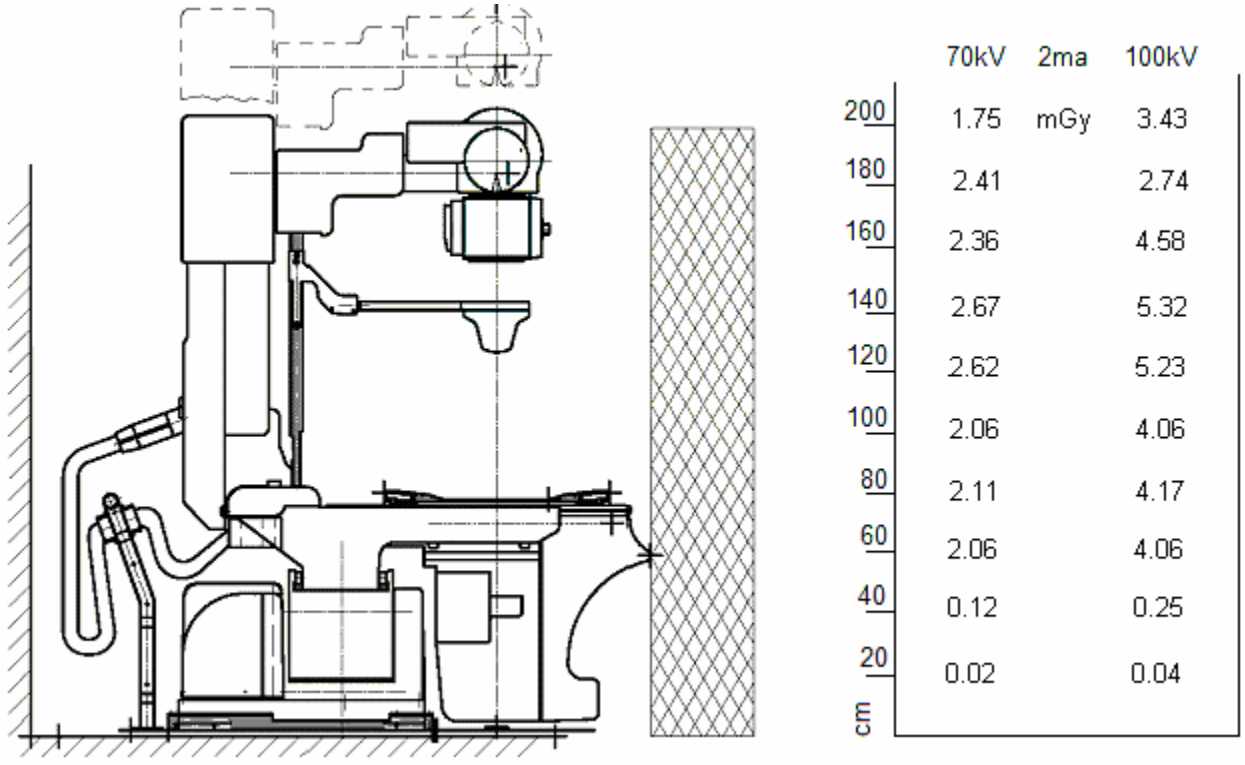

Figure 2: - Significant zone of occupancy – Horizontal position

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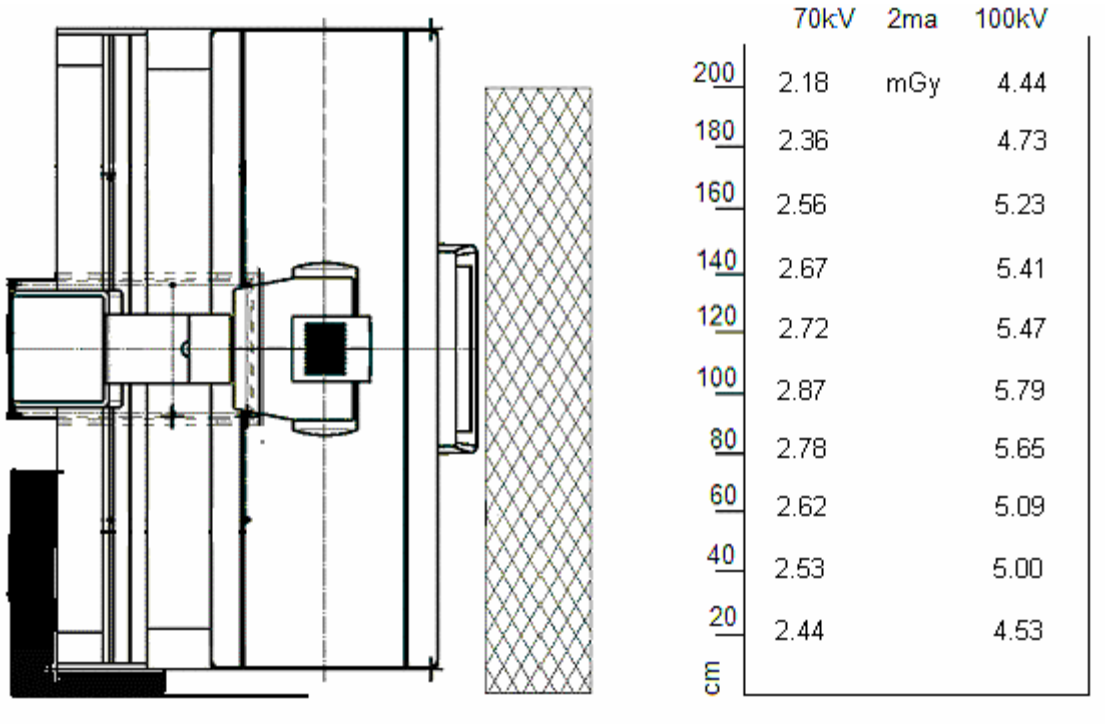

Figure 3: - Significant zone of occupancy – Vertical position

2.5.1. Functioning checks of the automatic systems

ATTENTION!
During the execution of all the functioning tests requiring the activation of the X-ray generator, you shall always wear your protective garments (lead aprons), you shall keep an adequate distance from the X-ray beam and, if necessary, you shall wear your pen dosimeter for the individual control to the X-ray exposure.

2.6. Electrical safety

WARNING:
Do not remove covers or cables from the system. High electrical voltages are present within this system. Removing covers or cables could lead to serious or fatal personal injury.

WARNING:
High voltages capable of causing death are present within this equipment. Refer all servicing to qualified service personnel only.

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WARNING:
Do not connect unapproved equipment to the rear of the console and of the touch screen.
Do not attempt to make any unauthorized connections to these or any other ports on the system. ***INCORRECT CONNECTIONS OR USE OF UNAPPROVED EQUIPMENT MAY RESULT IN INJURY OR EQUIPMENT DAMAGE.***
CONSULT YOUR SERVICE REPRESENTATIVE IF EXTERNAL EQUIPMENT IS TO BE CONNECTED TO THIS SYSTEM. PERIPHERAL DEVICES SHOULD BE IEC 601-1 APPROVED IF LOCATED IN THE PATIENT AREA, AND IEC 950 APPROVED IF OUTSIDE THE PATIENT AREA.

The user must always electrically disconnect system from mains before cleaning or disinfecting it.
Do not allow water or other liquid to enter the system as they may cause short-circuits and/or corrosion. It must be noted that some disinfectants vaporize, forming potentially explosive mixtures. Should such disinfectants be used, the vapors must first be allowed to disperse before the system is returned to use.

2.6.1. Equipotential ground connection

Precision RXi must be used only in procedure rooms that comply with all relevant legislation and recommendations concerning electrical safety in rooms and other operating spaces used for medical purposes (such as US National Electrical Code or IEC Standards). These give provisions for a protective (ground) terminal used for equipotential connection.
Additional equipment, such as an injector must also be connected to the protective ground (earth) terminal.

2.7. Other

2.7.1. Protection against contamination / infection / allergy / toxicity hazards

In order to prevent any patient contamination and according the local regulation, after each procedure, always clean parts of the equipment, which were in contact with the patient (patient table, mattress, image intensifier) with a bactericidal, germicidal and antiviral solution.
Check the solution used is also active against HIV virus and hepatitis B virus.

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2.7.2. Explosion safety

WARNING:
This equipment is not meant for working in areas subject to risks of explosions.
It is not safe to operate this system in the presence of potentially explosive or inflammable vapor, gas, or aerosols, since this could cause fatal or other serious personal injury and/or damage to the system.

It must be noted that some disinfectants vaporize, forming potentially explosive mixtures. Should such disinfectants be used, the vapors must first be allowed to disperse before the system is returned to use. Never operate this system in areas where there is a risk of an explosive atmosphere, including flammable anesthetic mixture with air or with oxygen or nitrous oxide.

2.7.3. Fire safety

WARNING:
Use only extinguishers on electrical or chemical fires which are specifically labeled for those purposes. Using water or other liquids on an electrical fire can lead to fatal or other serious personal injury.

Use of electrical equipment in an environment for which it was not designed can lead to fire or explosion.

Fire regulations for the type of medical area being used should be fully applied, observed and enforced. Fire extinguishers should be provided for both electrical an non-electrical fires.

All operators of this medical electrical equipment should be fully aware of and trained in the use of fire extinguishers and other fire-fighting equipment, and in local fire procedures.

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2.7.4. Check of the automatic collimation

- Insert a 35x43 cm cassette in the spot film device;
- Move the focal distance to 115 cm;
- Select a size division and verify that the collimator automatically sets to the selected value;
- Vary the focal distance and verify that the selected size keeps to the right value;
- Replace the cassette in the spot film device by a 24x30 cm cassette and repeat the test at a focal distance of 115 cm for at least two size subdivisions;
- Check that for each selected division the size is kept unchanged even if you change the focal distance.

2.7.5. Possibility of connection to other accessories

Since a safe connection of this equipment to other accessories may not be clear from the instructions applying to these accessories, the operator should always ask the relevant manufacturer or an expert in order to ensure that the connection does not affect the necessary safety against dangers to users and environment.

2.7.6. Other

WARNING:
DO NOT ATTEMPT TO INSTALL UNAUTHORIZED SOFTWARE ONTO ANY SYSTEM COMPONENT.

CAUTION:
DO NOT EXCEED THE TUBE MAXIMUM OPERATING LIMITS SHOWN IN THE SECTION X-RAY TUBE DATA AT THE END OF THE OPERATOR'S MANUAL. INTENDED LIFE AND RELIABILITY WILL NOT BE OBTAINED UNLESS GENERATORS ARE OPERATED WITHIN PUBLISHED SPECIFICATIONS.

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2.7.7. Equivalent filtration

Positioner

Housing inherent filtration	0.7 mm Al
Collimator inherent filtration	1.0 mm Al
Additional filtration	1.0 mm Al
	2.7 mm Al

Overhead Tube Suspension (OTS)

Housing inherent filtration	0.7 mm Al
Collimator inherent filtration	1.0 mm Al
Additional filtration	1.0 mm Al
	2.5 mm Al

Optional

DAP inherent filtration	0,24 mm Al

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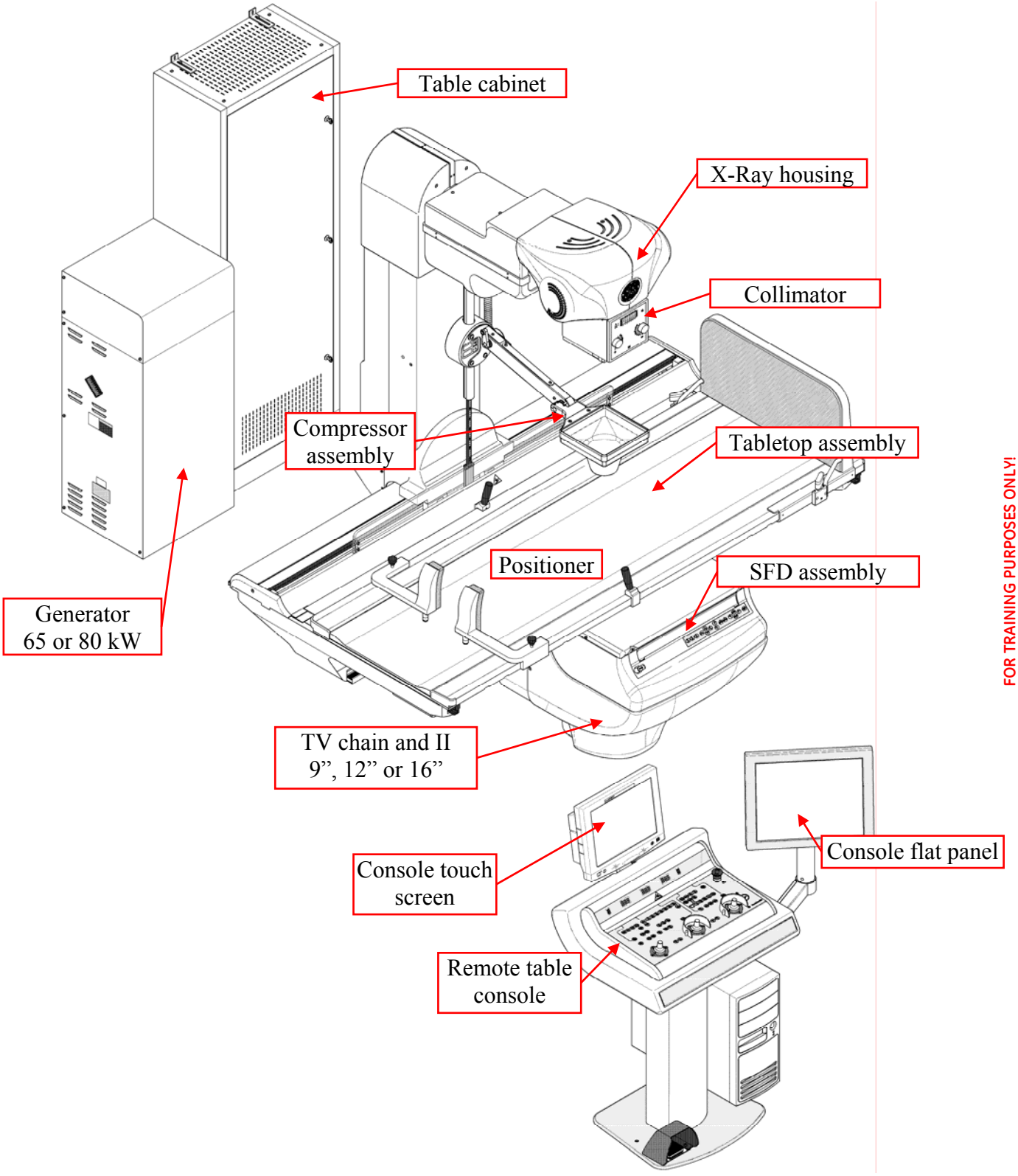
3. System overview



A typical configuration example

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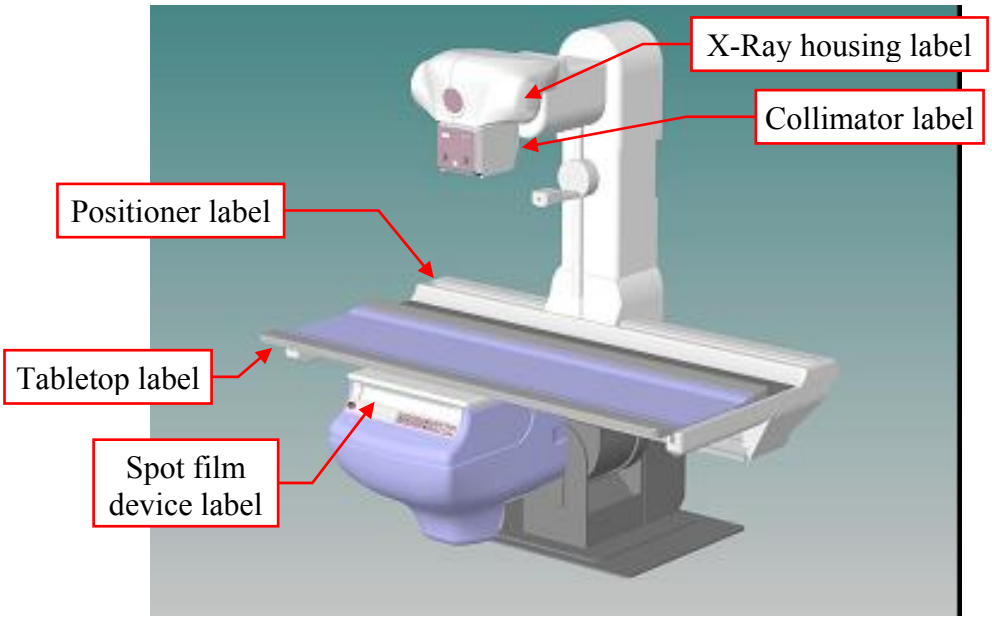
3.1. Labeling and identification

3.1.1. Positioner

The tables are identified by a series of adhesive labels placed on the control panel, the power cabinet and the tilting group. These labels are applied in order to ensure both the proper identification of the product from the commercial point of view and the compliance with the requirements established by the Standards in force.



positioner label

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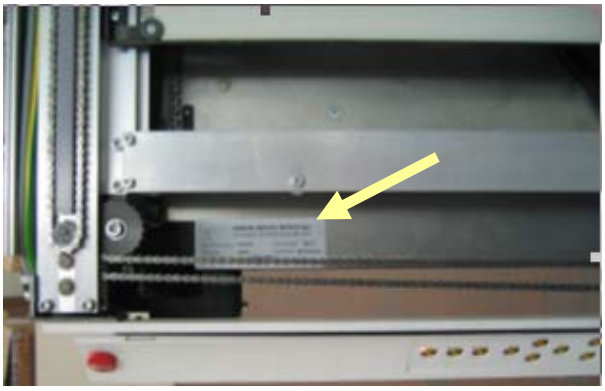
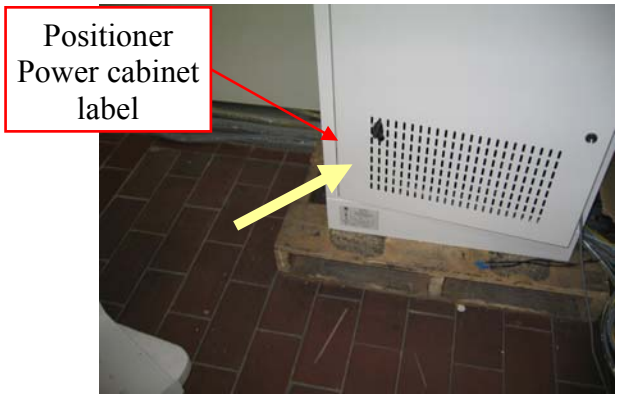
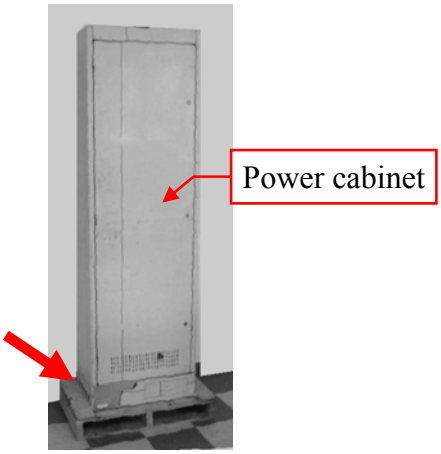
tabletop label

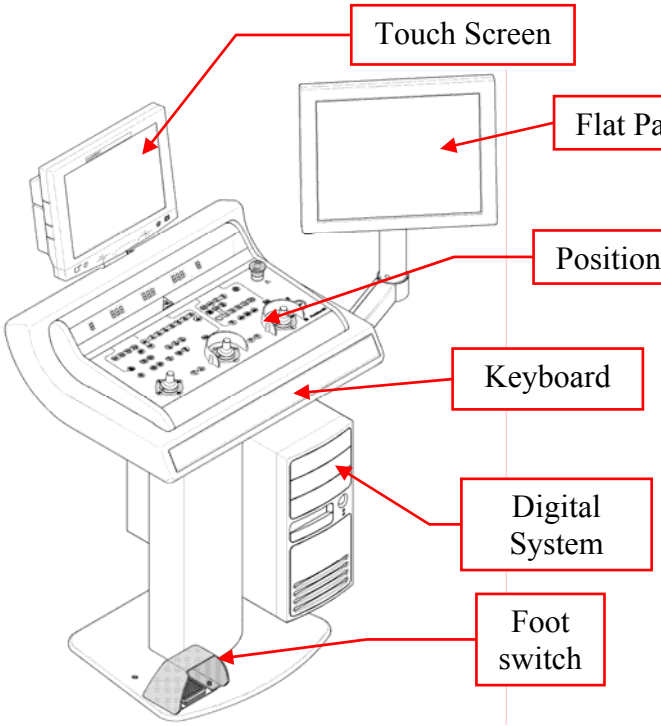


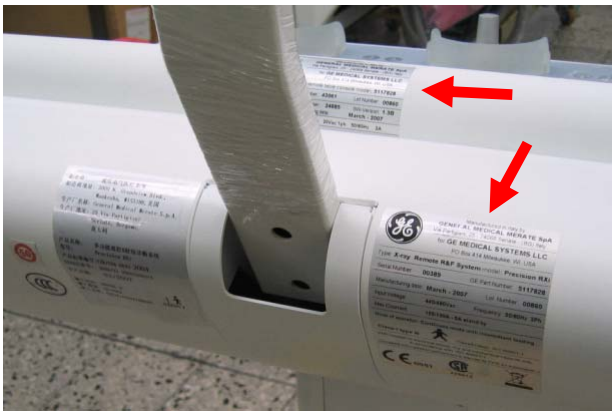
spot film device label





3.1.2. Consoles and user interfacings





Maufactured By GMM for GE

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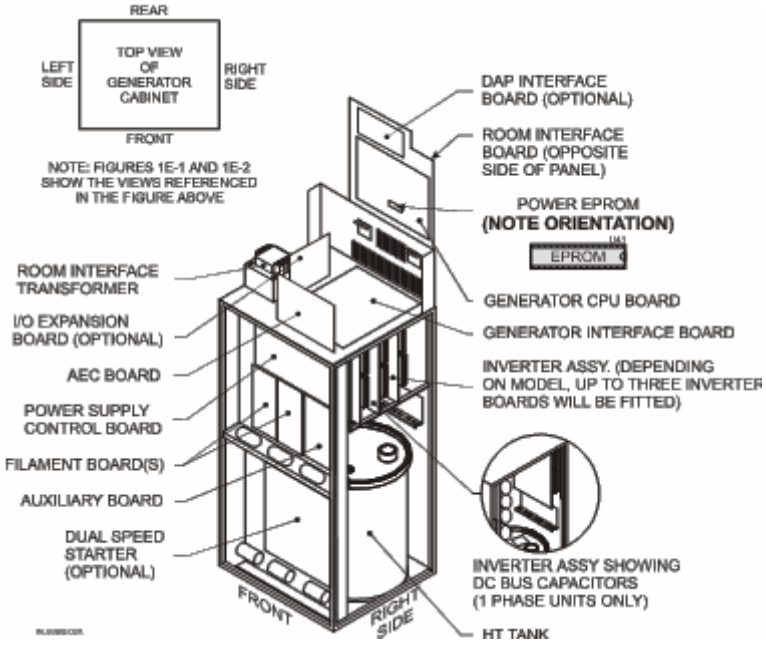
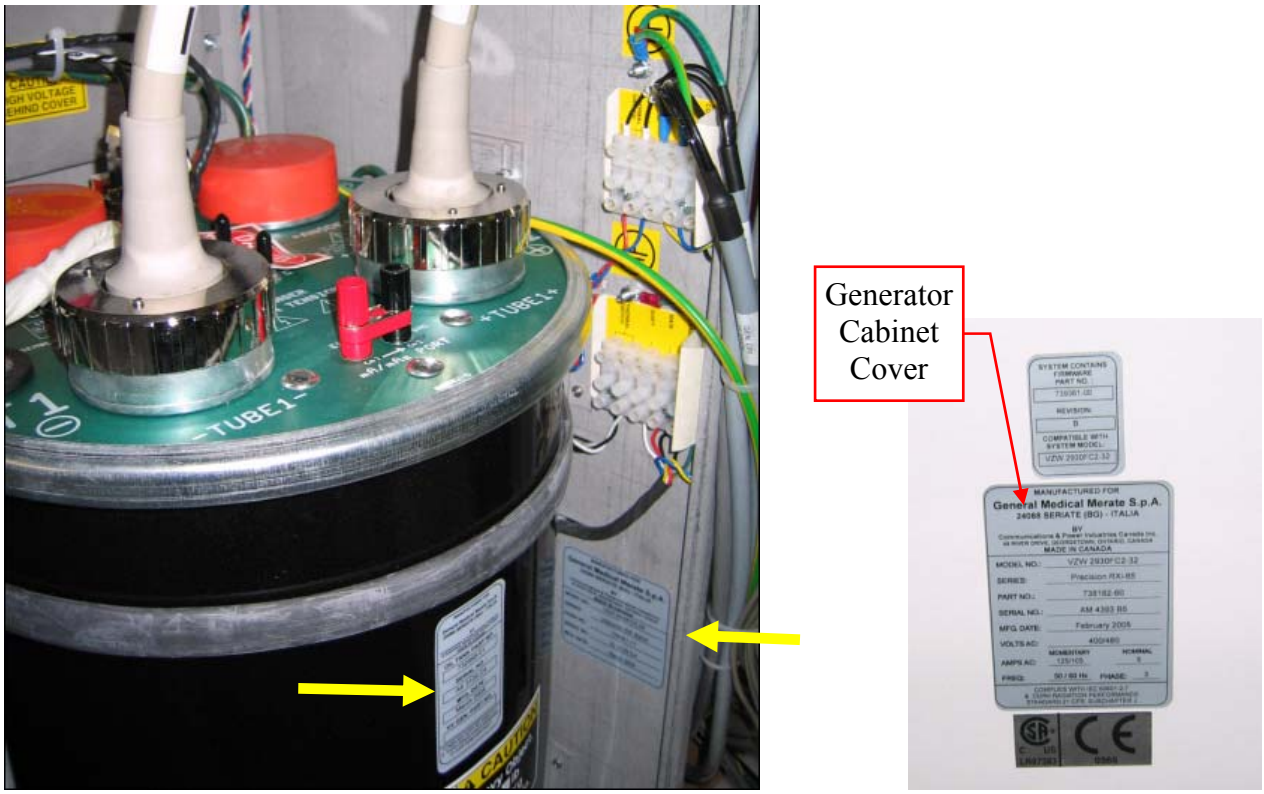
3.1.3. Generator

The following figure shows the major components within the front and right side of the generator cabinet.


REAR
LEFT SIDE
TOP VIEW OF GENERATOR CABINET
RIGHT SIDE
FRONT
NOTE: FIGURES 1E-1 AND 1E-2 SHOW THE VIEWS REFERENCED IN THE FIGURE ABOVE
DAP INTERFACE BOARD (OPTIONAL)
ROOM INTERFACE BOARD (OPPOSITE SIDE OF PANEL)
POWER EPROM (NOTE ORIENTATION)
EPROM
GENERATOR CPU BOARD
GENERATOR INTERFACE BOARD
INVERTER ASSY. (DEPENDING ON MODEL, UP TO THREE INVERTER BOARDS WILL BE FITTED)
ROOM INTERFACE TRANSFORMER
I/O EXPANSION BOARD (OPTIONAL)
AEC BOARD
POWER SUPPLY CONTROL BOARD
FILAMENT BOARD(S)
AUXILIARY BOARD
DUAL SPEED STARTER (OPTIONAL)
INVERTER ASSY SHOWING DC BUS CAPACITORS (1 PHASE UNITS ONLY)
HT TANK
FRONT
RIGHT SIDE

The following figure shows the labels position.



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3.1.4. Generator touch screen

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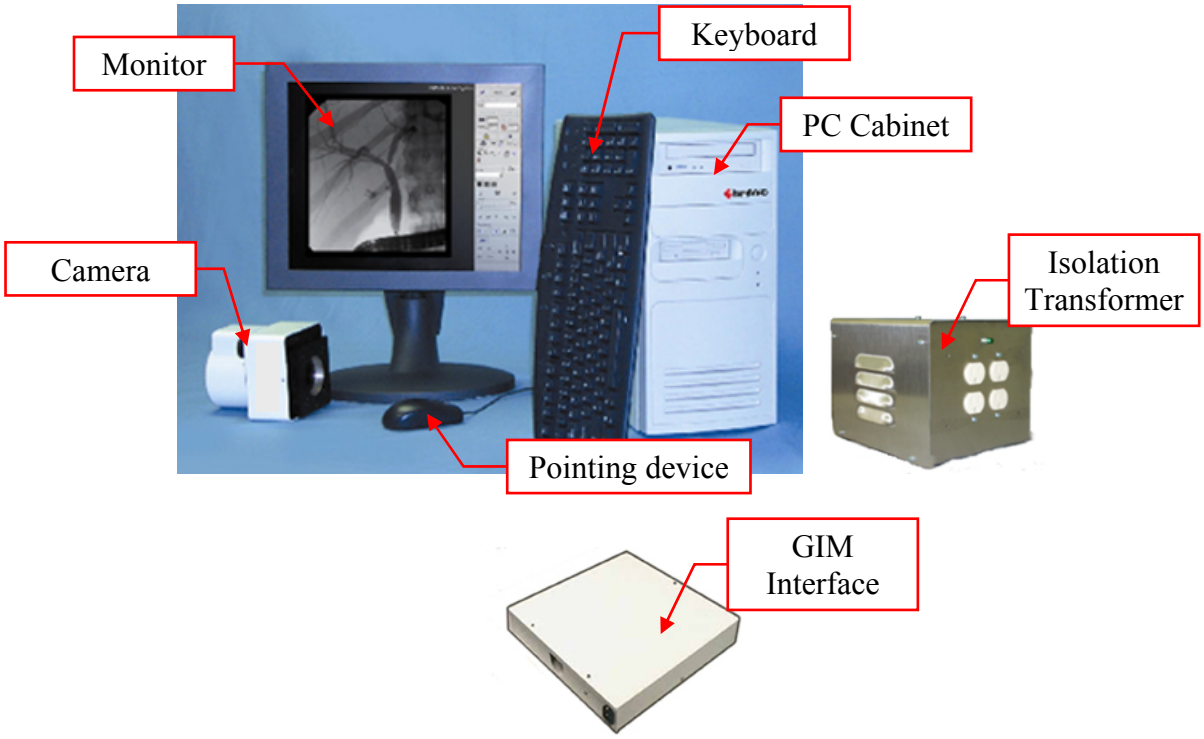
3.1.5. Digital system

Two configurations are available - RF or RF/DSA. All the equipment shown here are standard for both configurations.



- Monitor
  Used for viewing the menu screens and images. Used for Control Room and In-Room (Primary and Reference). Standard Flat Panel Monitor (shown) 19" Monochrome 1280x1024 pixels.
- Keyboard
  Standard 104 key w/PS2 connector.
- PC Cabinet
  Image Acquisition Processing Display Board (IAPDB); Hard Drive; 3.5" Floppy Drive; Internal PCI modem; CD-R/CD-RW Drive or DVD Optical Device
- Camera
  1024 x 1024 x 12 bit digital acquisition; Automatic System Calibration/Set-up; Image quality analysis/measurement software
- Pointing device
  Wheel Mouse or Track ball.
- Isolation transformer
  The system must be powered through the isolation transformer supplied by the manufacturer. Do not simply plug the system into a wall outlet!
  Verify correct voltage rating (shown on the side of the isolation transformer).
- GIM Interface
  The GIM is a self-contained module that provides electrical isolation between the Patient Contact Area equipment and the Control Room equipment.
  The GIM monitors X-ray generator activity and provides X-ray parameter information to the application via messages passed to and/or through the IAPDB.

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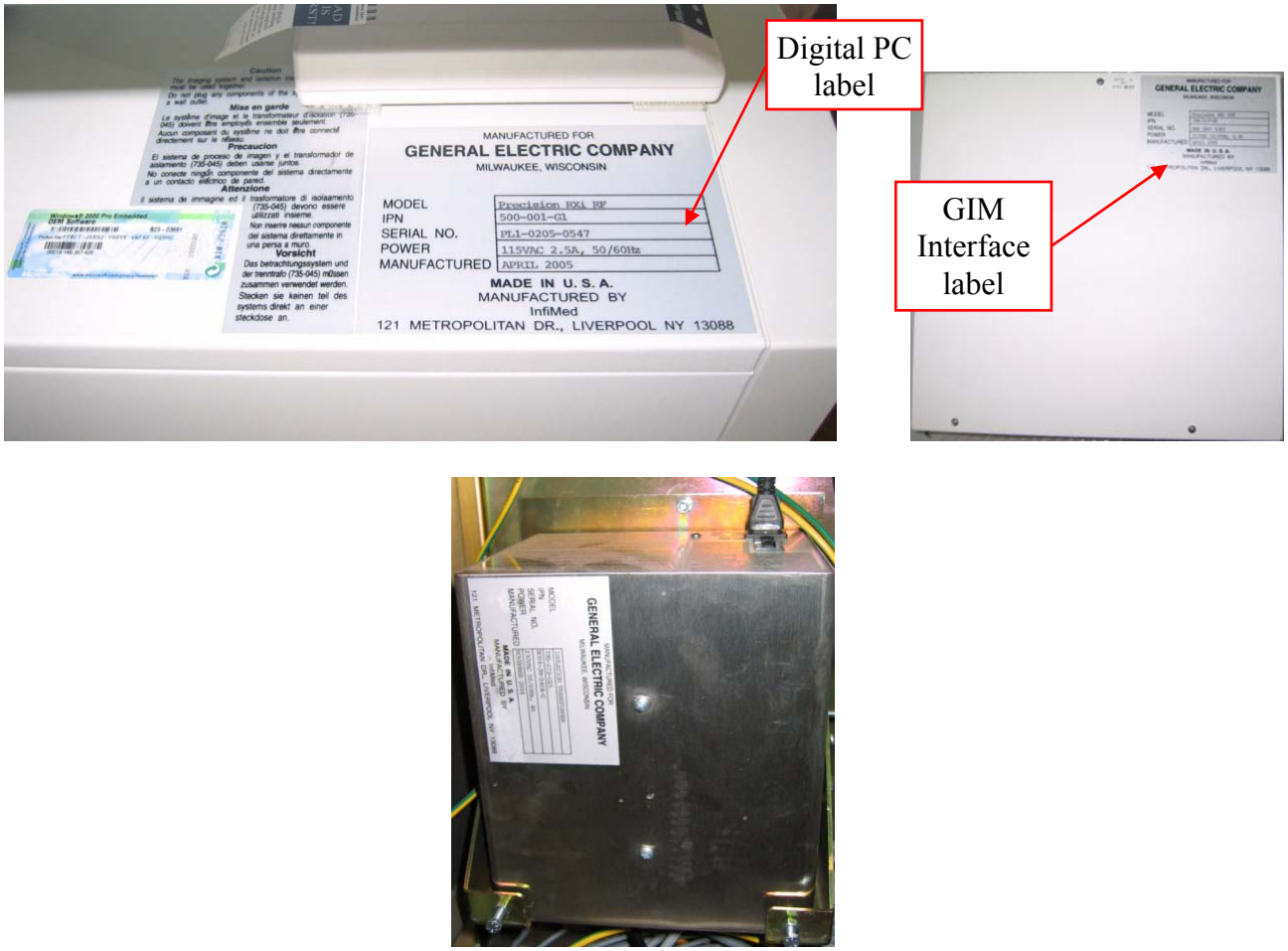
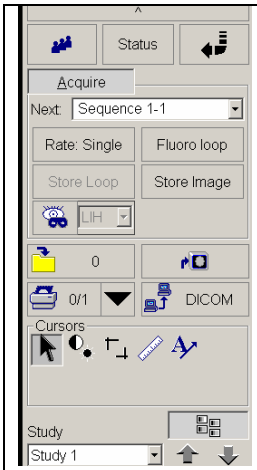
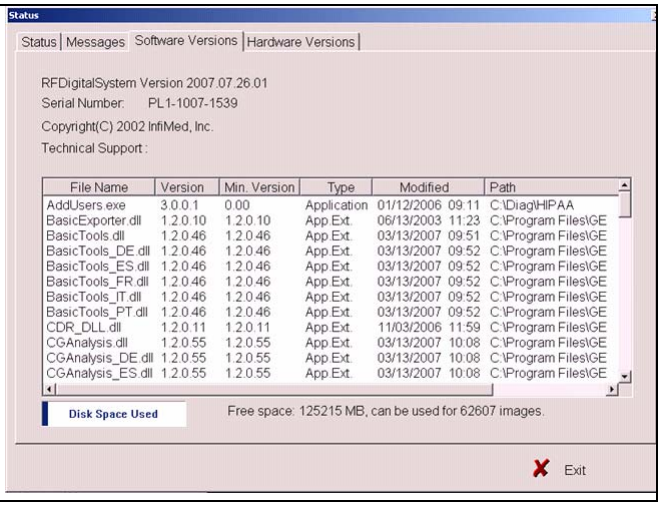


3.1.5.1. To obtain your software information



1. Click on "Status" button Status at the Main Image screen.
2. A new Status screen will display.
3. Click on Tab labeled "Software Versions" Software Versions.
4. A new Version screen will display.
5. The serial number (S/N) will be in format: PL1-xxxx-xxxx.


Status
Status | Messages | Software Versions | Hardware Versions
RFDigitalSystem Version 2007.07.26.01
Serial Number: PL1-1007-1539
Copyright(C) 2002 InfiMed, Inc.
Technical Support :
File Name | Version | Min. Version | Type | Modified | Path
AddUsers.exe 3.0.0.1 0.00 Application 01/12/2006 09:11 C:\Diag\HIPAA
BasicExporter.dll 1.2.0.10 1.2.0.10 App.Ext. 06/13/2003 11:23 C:\Program Files\GE
BasicTools.dll 1.2.0.46 1.2.0.46 App.Ext. 03/13/2007 09:51 C:\Program Files\GE
BasicTools_DE.dll 1.2.0.46 1.2.0.46 App.Ext. 03/13/2007 09:52 C:\Program Files\GE
BasicTools_ES.dll 1.2.0.46 1.2.0.46 App.Ext. 03/13/2007 09:52 C:\Program Files\GE
BasicTools_FR.dll 1.2.0.46 1.2.0.46 App.Ext. 03/13/2007 09:52 C:\Program Files\GE
BasicTools_IT.dll 1.2.0.46 1.2.0.46 App.Ext. 03/13/2007 09:52 C:\Program Files\GE
BasicTools_PT.dll 1.2.0.46 1.2.0.46 App.Ext. 03/13/2007 09:52 C:\Program Files\GE
CDR_DLL.dll 1.2.0.11 1.2.0.11 App.Ext. 11/03/2006 11:59 C:\Program Files\GE
CGAnalysis.dll 1.2.0.55 1.2.0.55 App.Ext. 03/13/2007 10:08 C:\Program Files\GE
CGAnalysis_DE.dll 1.2.0.55 1.2.0.55 App.Ext. 03/13/2007 10:08 C:\Program Files\GE
CGAnalysis_ES.dll 1.2.0.55 1.2.0.55 App.Ext. 03/13/2007 10:08 C:\Program Files\GE
Disk Space Used
Free space: 125215 MB, can be used for 62607 images.
Exit

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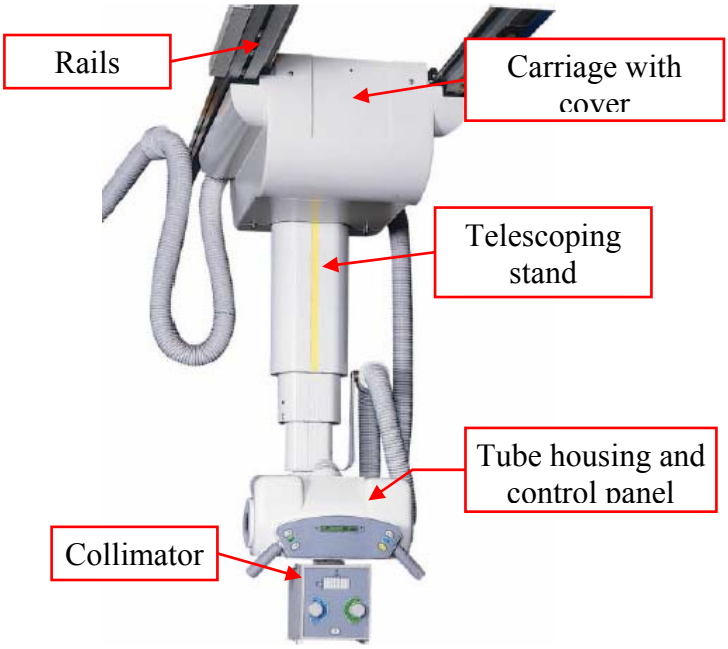
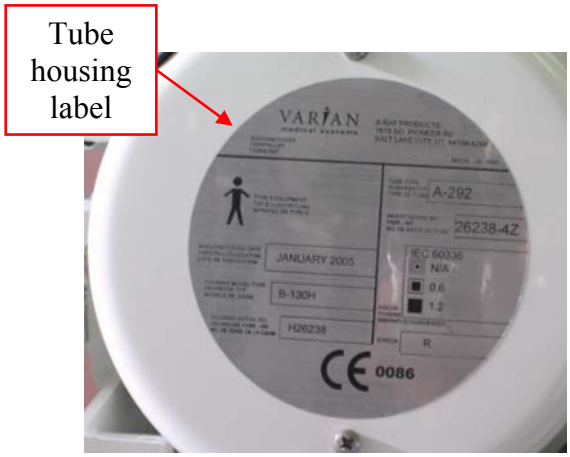
3.1.6. Overhead Tube Suspension (OTS)

The OTS supports and moves X-ray tube and collimator.





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3.1.6.1. Longitudinal rails

The longitudinal rails are attached to the radiology room ceiling and allow the positioning of one or more mechanical devices that display the alignment position of the beam to one of more receptors placed in the radiological room.

3.1.6.2. Transversal bridge

The transversal bridge slides on the longitudinal rails and the carriage with the telescopic stand moves inside this bridge.

3.1.6.3. Carriage and telescoping stand

The telescoping elements are connected to each other through stainless steel ropes and uses springs support the weight of the stand and of the X-ray tube.
The main support rope is alongside the safety rope that protects operators and patients from danger or injury in case of the main cable failure. In the case of such a failure the safety device becomes immediately operative and blocks the telescoping extension movement.

ATTENTION:
Never use the ceiling suspension when the safety device is engaged.
DO NOT TRY TO PULL DOWN THE X-RAY TUBE WHEN THE MAIN CABLE IS BROKEN.
Immediately call the technical staff to replace the broken cable.

3.1.6.4. Horizontal support arm and control panel

The horizontal support arm that supports the X-ray tube is fixed to the lower end of the telescoping stand and can rotate around the vertical axis.
The X-ray tube is fixed to one of the horizontal arm extremities. The control panel is placed in front of the X-Ray tube; its push buttons control the brakes while its handles are used for moving the OTS. The control panel contains all controls for the moving of the OTS and uses different colors to indicate motion along each different axis.

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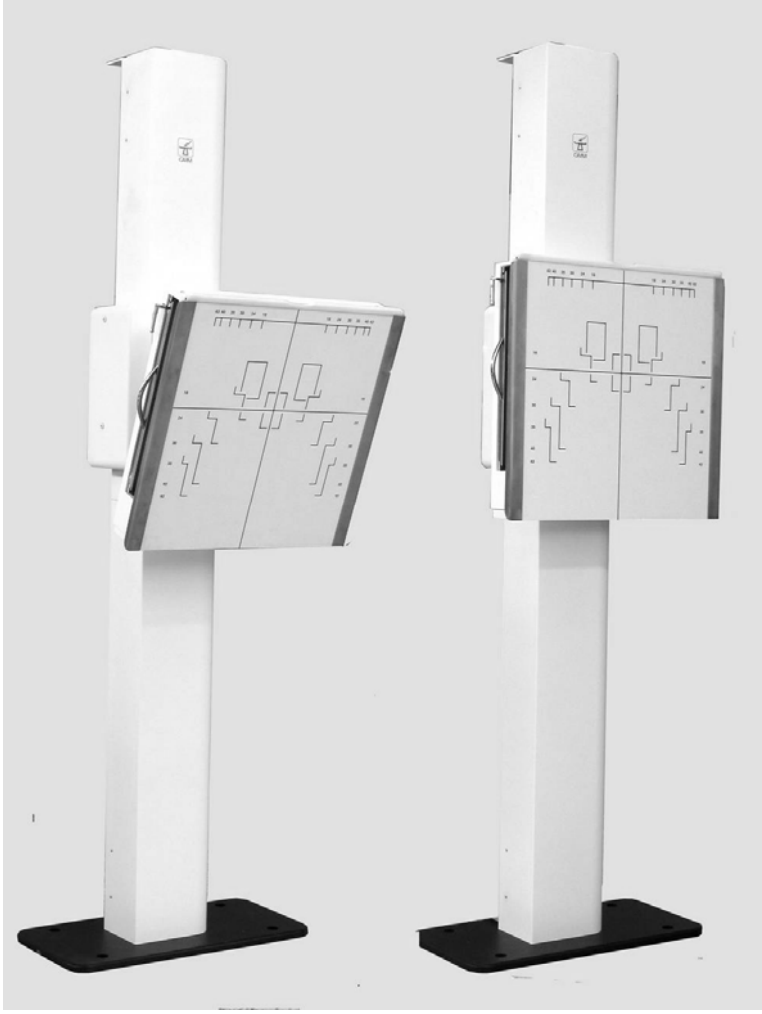
3.1.7. Wallstand

WS-T vertically adjustable with tilting device
WS - vertically adjustable



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3.1.7.1. Labels

On the unit there must be:

- a part number label; wire ropes replacement label; serial number label; etc.
- Their shape and placement is shown in the drawings on the following pages.
- Do not remove the adhesive labels on the unit. They are important in order to track the manufacturer and the equipment serial number

Wallstand showing the attached labels

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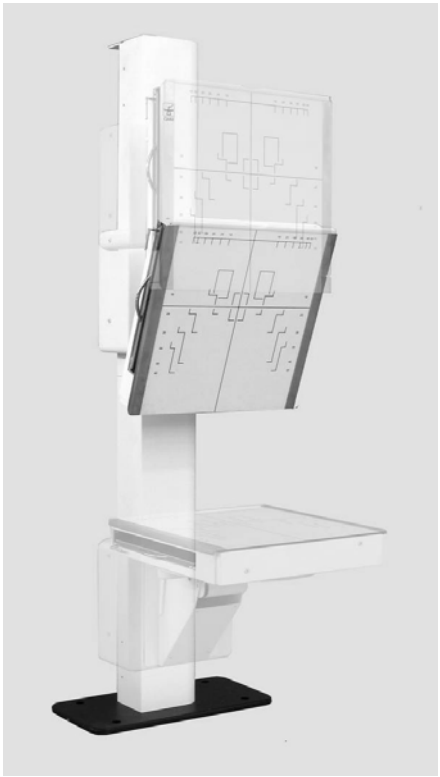
3.1.7.2. Main features

- Column stand with floor-wall or floor base fastening
- Bucky for radiographic cassettes up to 35x43 cm with counterbalanced vertical movement
- Mechanical block on all the movements

Complete with grid and pre-set for measuring chamber of automatic exposure control.



WS	
bucky vertical travel	136.5 cm
movement mode/braking	manual/mechanical
balancing mode	counterweights
minimum distance from floor of the bucky upper edge	67.3 cm
weight	170 kg

WS-T	
bucky vertical travel	136.5 cm
movement mode/braking	manual/mechanical
balancing mode	counterweights
bucky tilting	-20° e +90°
bucky rotation on its axis	90°
minimum distance from floor of the bucky upper edge	64.8 cm
minimum distance from floor of the bucky in horizontal position	69.3 cm
weight	200 kg

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BUCKY	
cassette formats	from 13x18 to 35x43 cm
grid characteristics	90 lines/inch R=12:1 F= 180 cm

STANDARD ACCESSOIRES
bucky with cassette sensing
measure chamber of automatic exposure control

OPTION AND ACCESSOIRES	
arm support	
external cassette holder	35x43

NORMATIVE REFERENCES	
standard compliance	EN 60 601-1, 60 601-2-32
classification (IEN/ CEI EN 60 601)	class I – type B

3.1.7.3. Al Equivalency Value

The wallstand can be provided either with front panel with equivalent filtration of 1 mm Al or 0.65 mm Al. Please make reference to product label.

3.1.7.4. Bucky LREFA model

The bucky's are available in 2 main versions:

LRE for manual collimation.
LREFA for cassette size sensing.

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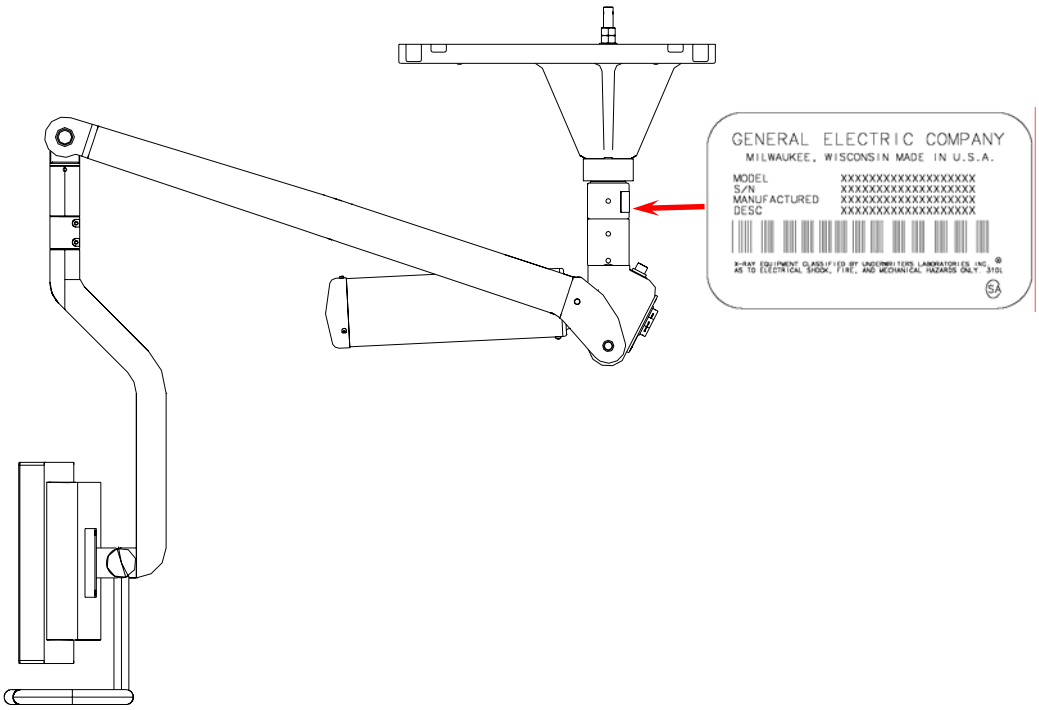
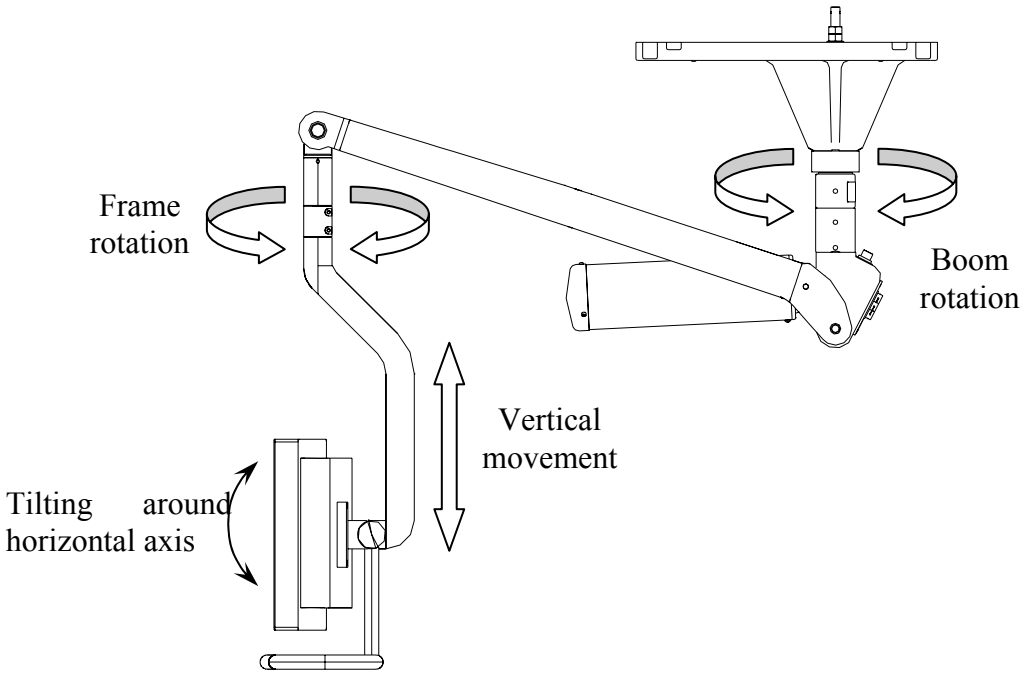
3.1.8. Monitor Suspension





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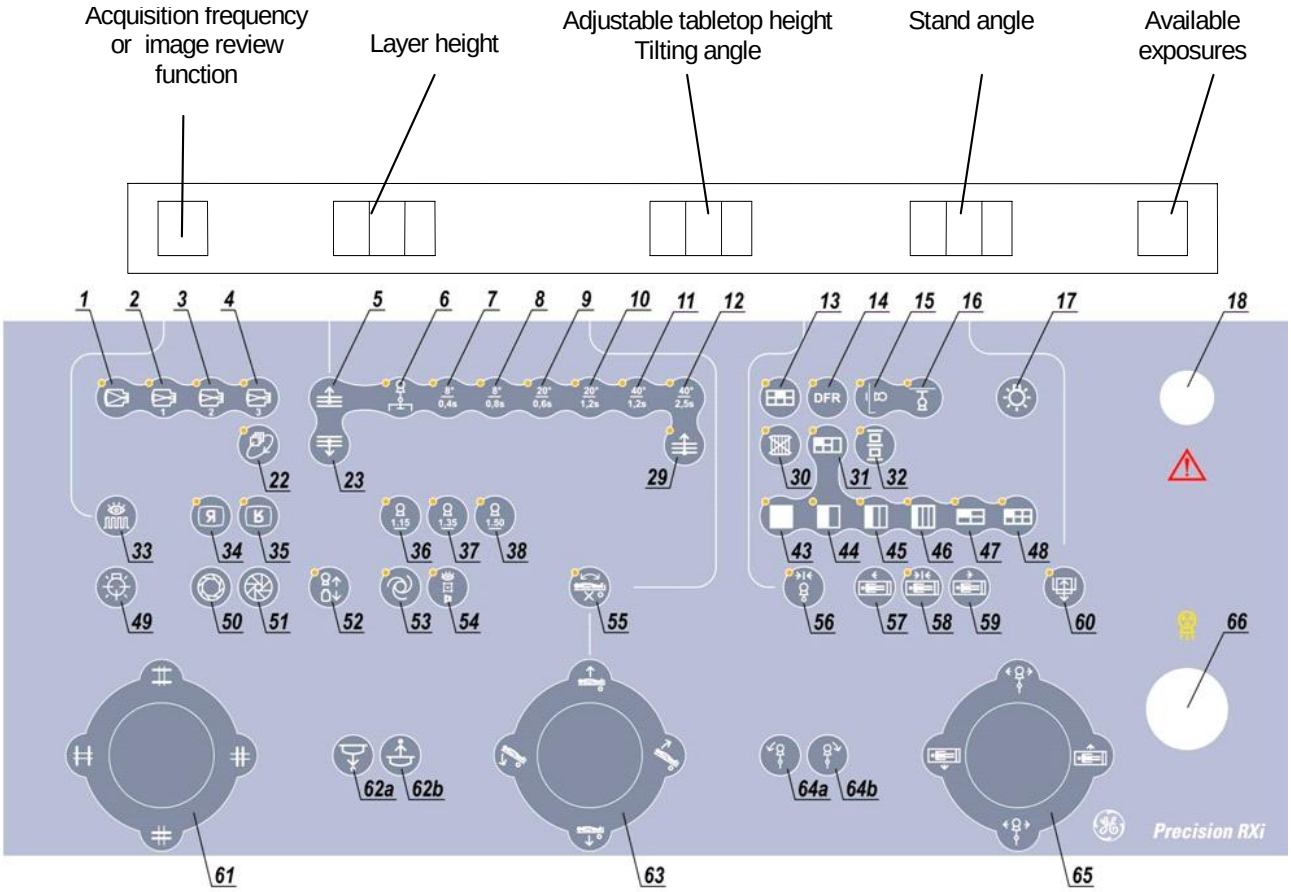
3.1.9. Positioner console overview



1,2,3 I.I. magnification choice	**49** Collimator lamp
5,23 Layer height choice	**50,51** Iris diaphragm (optional)
6,7,8,9,10,11,12 Tomography functions	**52** I.I. elevation
13,14 Conventional, digital radiography selection	**53** Automatic/semi-automatic collimation
15 Table tube rotation indicator	**54** Bucky collimation
16 OTS park position indicator	**55** Stop tabletop in the horizontal position
17 Control of the room light	**56** Stand vertical position
18 Emergency stop push-button	**57,58,59** Tabletop longitudinal displacement (option)
22 Review or image memorization functions (1k analog systems only)	**60** Cassette in/out
29 Automatic sequences in tomography	**61** Diaphragms collimation
30 Parking the grid	**62** Compressor
31 Mixed divisions	**63** Tilting movement / elevation
32 Rapid spot filming	**64** X-ray tube stand angulation
33 Review or image memorization functions (1k analog systems only)	**65** Patient scanning movements
34,35 Image inversion (analog systems only)	**66** X-ray exposure
36,37,38 Focal distance control	
43,44,45,46,47,48 Size division choice	

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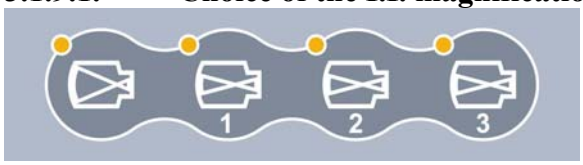
3.1.9.1. Choice of the I.I. magnification factors

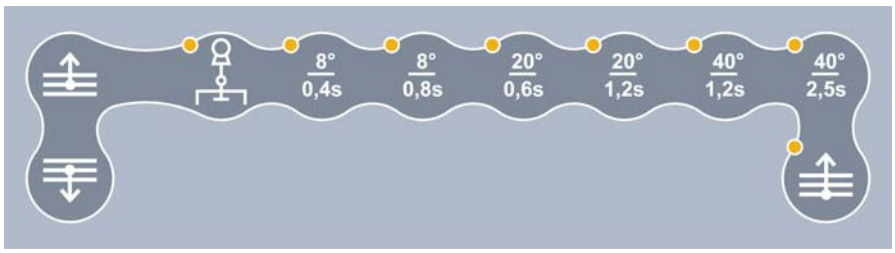


1 2 3 4

By means of these push-buttons (1, 2, 3 and 4) the operator can select the most appropriate I.I. field (ZOOM) according to the area to be diagnosed. In order to obtain the best results, we suggest you use the maximum magnification factor for the area to be examined.

3.1.9.2. Tomographic functions

5 6 7 8 9 10 11 12



23 29

The tomographic functions can be activated by pressing one of these push-buttons **(7, 8, 9, 10, 11, 12)**. Each push-button allows the selection of the angle and scanning time. The LED will blink until the preparation condition is reached.
The push-button on the left (6) deactivates the tomographic functions (condition activated when the equipment is switched on).

3.1.9.3. Selection of the tomographic layer height

These two push-buttons **(5** and **23)** allow you to choose the tomographic layer height, with respect to the virtual fulcrum (maximum value) around which the rotation of the "X-ray tube/Image receptor" group is executed for the X-ray incidences or oblique radioscopy incidences.

- The layer height is displayed
- The upper push-button (5) moves the layer height to the higher values.
- The lower push-button (23) moves the layer height to the lower values.

The layer height selection ranges from 0 to 330 millimeters

3.1.9.4. Automatic sequences in tomography

This push-button **(29)** allows you to automatically increase the tomographic layer height. The increase value is set in Service Mode and can range from 1 to 10 millimeters (default value is 5 mm).

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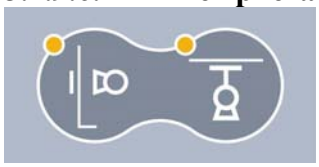
3.1.9.5. Conventional radiography and digital radiography selection

13 **14**

These push-buttons **(13** and **14)** select the mode of image acquisition of the images; film or digital.

3.1.9.6. Peripheral position indicators



15 **16**

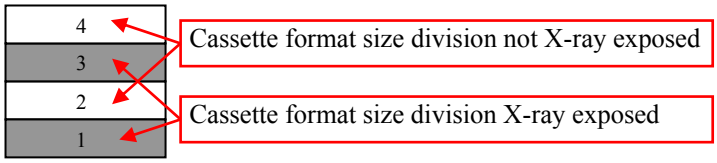
The LEDs **(15** and **16)** indicate an exam being performed on equipment other than the table.
The wallstand indicator LED **(15)** lights up when the table tube is rotated out of 0°. Certain system functionality may be inhibited when this indicator is on.
The OTS indicator LED **(16)** lights up when the OTS is not in the park position. In this case certain table movements will be inhibited to avoid collision between the table and tube suspension.

3.1.9.7. Switching on of the X-ray room lighting system

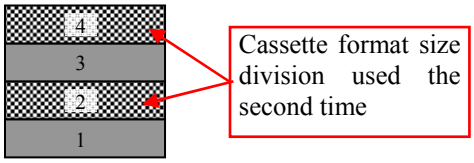
17

Depending on configuration in Service Mode this push button can have two different functions:

Option 1) Turns on of the X-ray room lighting.
Option 2) "Spot Filming Program Progression" function. By pushing push button (17) it is possible to skip a cassette division in order to reach the cassette division desired. The skipped cassette size division that is not exposed can be used by inserting the same cassette and skipping the cassette divisions already exposed.



Cassette with division size format inserted for the first time.



Same cassette inserted for a second time

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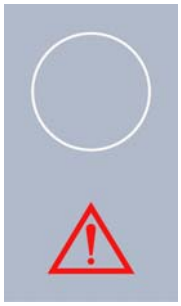
3.1.9.8. Emergency stop push-button



18

A large red push-button is placed on the left upper corner to power the table ON and OFF **(18)**.
Pull the push-button up to turn on power; press it down to turn off power.
The symbol placed below this push-button is to remind the operator that before using the equipment it is necessary to be knowledgeable about its performance.
Another red push button with the same function is placed next to the spot film device.

3.1.9.9. Review or image memorization functions (1K analog systems only)

22

Push button (22) functions:

- During fluoroscopy, push button (22) starts/stops image sequence memorization at the speed previous selected by push button (33)
- During review function, the push button (22) starts/stops sequence image display at the speed previous selected by push button (33).

3.1.9.10. Grid

30

By means of this push-button **(30)** it is possible to insert/remove the grid in the X-ray beam field.

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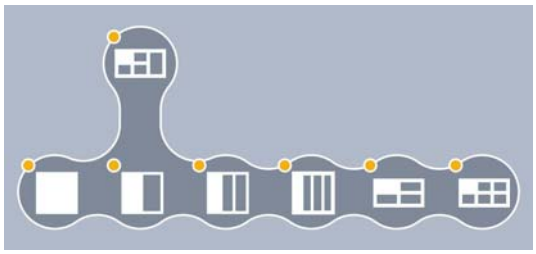
3.1.9.11. Mixed divisions

31



43 44 45 46 47 48

This push-button **(31)** activated the mixed divisions function.
If you press this push-button, the available sequence will be automatically selected; within a program it is possible to change the kind of division.
According to the cassette size and the kind of SFD (with or without crossed-division) some push-buttons **(43, 44, 45, 46, 47 and 48)** deactivate, while the remaining ones can be selected in order to choose the division execution sequence. The selected sequence is indicated by the LED that will be lit for the program that is first executed and will blink for the program executed later on.

3.1.9.12. Rapid spot filming

32

If you simultaneously press this push-button **(32)** and the X-ray exposure push-button a series of exposures will automatically be executed according to the chosen size division.
This function will deactivate at the end of the exposure of the last section of the film or as soon as you release the exposure push-button.

3.1.9.13. Acquisition frequency or review function (1K analog systems only)

33

Push button (33) functions:
This push button **(33)** sets the review or memorization image frequency. The value of memorization frequency or images review is displayed

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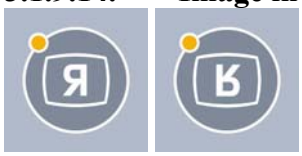
3.1.9.14. Image inversion on the monitor (analog systems only)



34 **35**

By means of these push-buttons **(34** and **35)** it is possible to select image inversion:

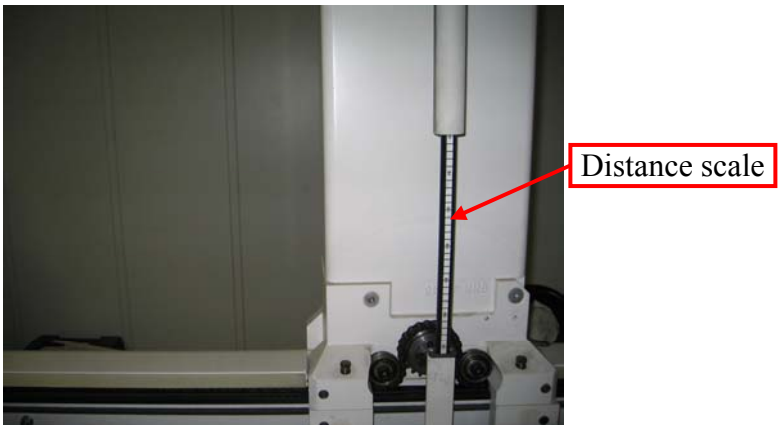
- Right-to-left image inversion (34)
- Up-to-down image inversion (35)

Note: On digital systems this function is performed on the digital interface.

3.1.9.15. Focal distance control

36 **37** **38**

- These push-buttons (36, 37 and 38) allow the possibility to move the focal distance toward the value indicated on the selected push-button.
- When the focal distance is at a value between those indicated on the buttons, the three LEDs will blink.
- When the focal distance is at exact value indicated on a button, the LED on that button will be lit.
- The scale on the compressor column always indicates the focal distance.



NOTE:
The X- ray maximum fluoro dose value will be compensated related to focal distance choice.

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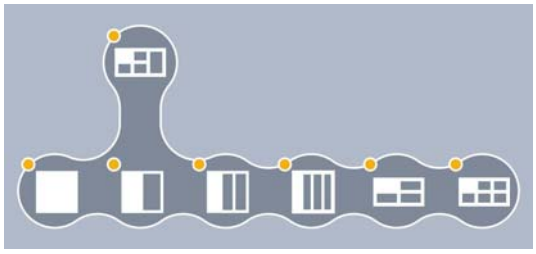
3.1.9.16. Size division choice



43 44 45 46 47 48

These push-buttons **(43, 44, 45, 46, 47** and **48)** allow the operator to program the film division.

- The SFD transversal division options allow the division of any size in the transversal direction;
- The SFD crossed division options allow the crossed subdivision in 4 and 6 for the 18x24, 24x24, 24x30 cassette sizes.
  - > Button **(43)** on the left is always activated when the equipment is switched on and provides for the use of the film in the entire size.
  - > Button **(44)** allows division in 2
  - > Button **(45)** allows division in 3
  - > Button **(46)** allows division in 4.
  - > Button **(47)** allows crossed-division in 4 (with crossed SFD division only)
  - > Button **(48)** allows crossed-division in 6 (with crossed SFD division only)

The LED placed on each push-button indicates the division currently selected.
The number of available exposures is displayed according to the selected division.
The selected film size division automatically determines the automatic collimation of the X-ray beam.
Each time a radiography is commanded, the division program advances one step while the number of available exposures (shown on the display) decreases. After exposing the last division of the film, the cassette is automatically sent to its parking position and the display shows that the division program is over (0 radiographs available); it is not possible to execute any more X-ray exposures. It is always possible to perform fluoroscopy between one exposure and another by pressing the foot control lever of fluroscopy. The following X-ray exposure will be executed by turning back to the point where the division program was last interrupted.
When the X-ray exposure series is over, you can execute other exposures only after replacing the X-ray cassette. When you replace the X-ray cassette, the division program last selected will remain active.

3.1.9.17. Collimator Lamp

49

Using push-button (**49**) the operator can switch on or off the collimator lamp. After being switched on the lamp will automatically switch off after 30 seconds.

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3.1.9.18. Iris diaphragms (optional)

50 **51**

These push-buttons **(50 and 51)** are provided for controlling the iris diaphragm: the push-button on the left **(50)** opens the diaphragm, while the push-button on the right **(51)** closes it.

3.1.9.19. Image Intensifier elevation

52

This push-button **(52)** allows fluoroscopy exams to be made with the I.I. placed at the minimum distance from the tabletop (normal condition – LED off) or with the I.I. left at the same distance that it assumes when SFD cassette-holder is in field (efficiency condition - LED on).

- The normal condition is the best possible condition for geometrical magnification and resolution.
- The efficiency condition minimizes the transition time from fluoroscopy to radiography.

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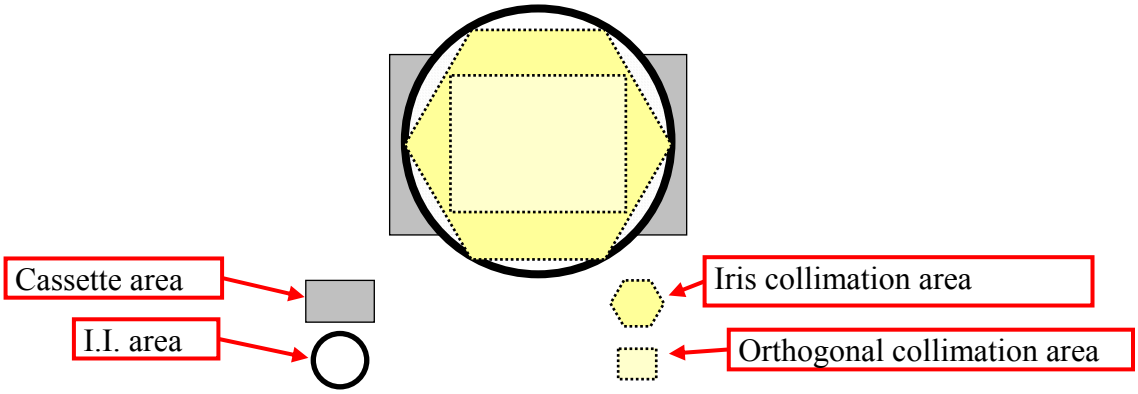
3.1.9.20. Collimator mode

53 **54**

These push-buttons are used to select the collimation mode:

- The push-button (53) selects the Automatic or Semi-automatic mode
- Solid LED indicates Automatic mode
- Flashing LED indicates semi-automatic mode
- The push-button (54) selects Bucky mode

In all modes, it is always possible to collimate down using the control lever **(61)** or the controls on the collimator.



- Automatic collimation-push button (53) LED solid

53 **54**

In this mode, the X-ray field in fluoroscopy will always be limited to the smallest of the II, cassette, or division size.
In radiography, the X-ray field will be the cassette or division size. Any collimation made in fluoroscopy will be lost in radiography.
During a fluoroscopy exam with a smaller cassette inserted, it is possible to open the collimator shutters to the I.I. size using the joystick (61), but as soon as the joystick is released the shutters will return to their previous position.

Example (also see accompanying pictures that follow):
Field size in fluoroscopy:

1) If cassette is larger than II : X-ray field = II size
2) If cassette is smaller than II: X-ray field = cassette size

Field size in radiography:

1) If cassette is smaller than II: X ray field = cassette size
2) If cassette size bigger than II: X ray field = cassette size

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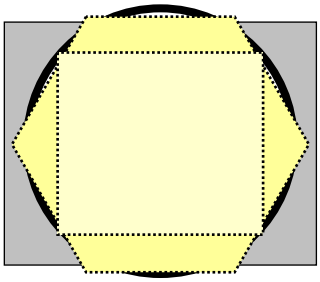
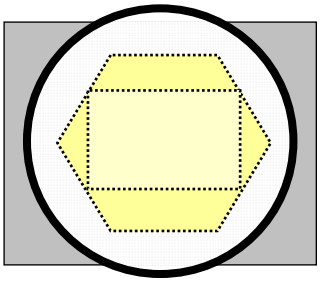
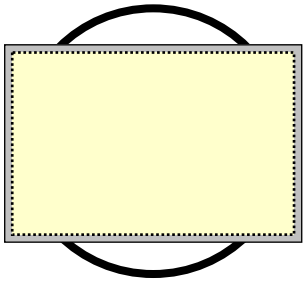
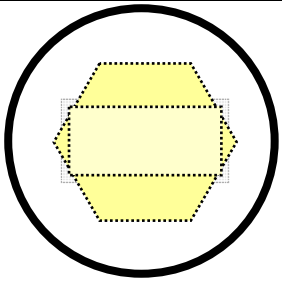
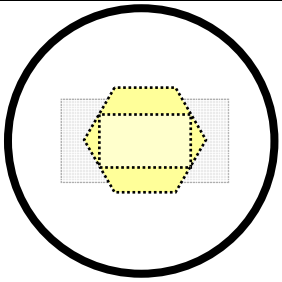
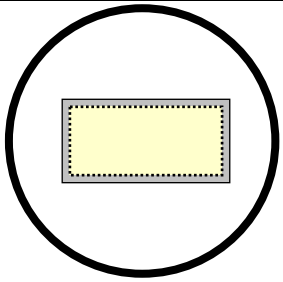
Cassette larger than II

Step 1: Fluoroscopy	Step 2: Reduce collimation in f fluoroscopy	Step 3: Result in Radiography (automatic collimation)
		

Cassette smaller than II

Step 1: Fluoroscopy	Step 2: Reduce collimation in fluoroscopy	Step 3: Result in Radiography (automatic collimation)
		

- Semiautomatic collimation - push button (53) LED flashing

53 **54**

There are three possible settings for this mode; the setting is selected in Service Mode.

- Setting 001: Collimation in Radiography = Collimation in Fluoroscopy
- Setting 002: In Radiography, perpendicular collimation opens to film size
- Setting 003: In Radiography, only perpendicular collimation changes are maintained
- Setting 004: In Radiography, only perpendicular collimation changes are maintained and iris opens to film size

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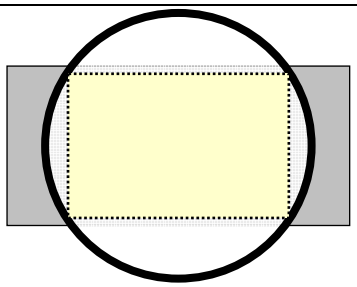
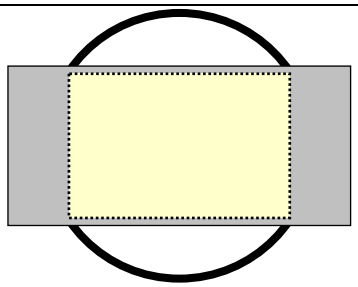
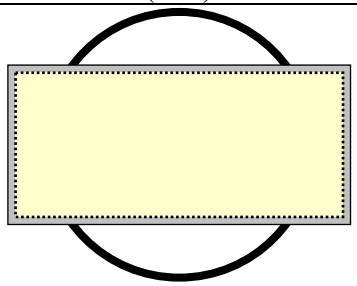
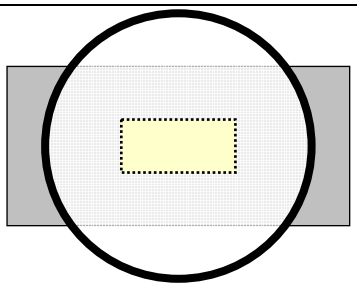
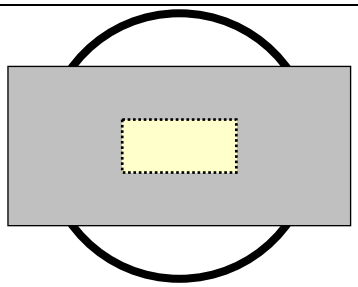
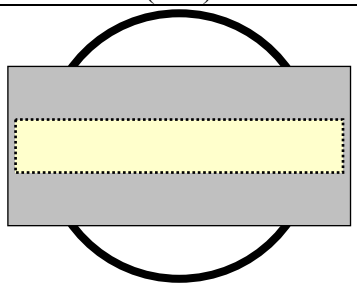
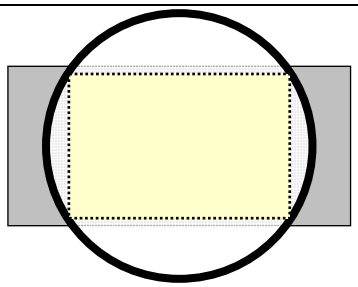
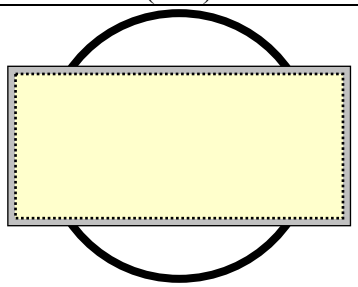
Setting 001: Collimation in Radiography = Collimation in Fluoroscopy
In Fluoroscopy, the X-ray field will be limited to the smallest of the II, cassette, or division size.
In Radiography, the collimation seen in fluoroscopy will be maintained.
Further collimation in radiography can be made using the joystick.

Step 1: Fluoroscopy (001)	Step 2: Result in Radiography (001)	Step 3: Perpendicular collimation in Radiography (001)
		

Step 1: Collimation in Fluoroscopy (001)	Step 2: Result in Radiography (001)	Step 3: Perpendicular collimation in Radiography (001)
		

Setting 002: In Radiography, perpendicular collimation opens to film size
In Fluoroscopy, the X-ray field will be limited to the smallest of the II, cassette, or division size.
In Radiography, any parallel collimation made in fluoroscopy will be maintained but perpendicular collimation will be lost and collimation will open to film size.

Step 1: Fluoroscopy (002)	Step 2: Result in Radiography (002)
	

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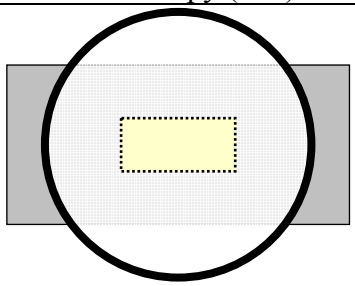
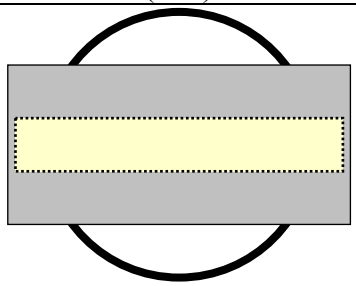
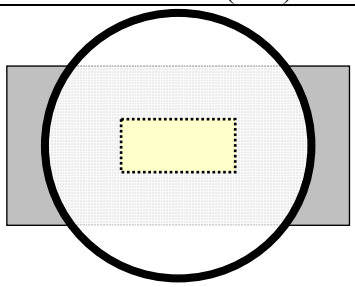
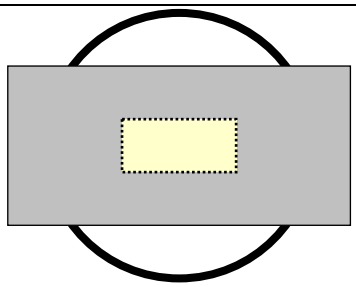
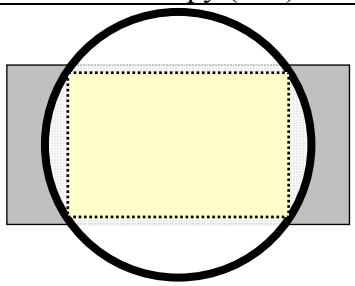
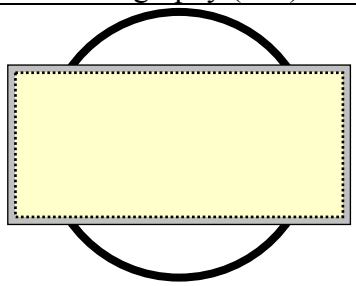
Step 1: Collimation in Fluoroscopy (002)	Step 2: Result in Radiography (002)
	

Setting 003: In Radiography, only perpendicular collimation changes are maintained
In Fluoroscopy, the X-ray field will be limited to the smallest of the II, cassette, or division size.
In Radiography, any changes made to the position of the perpendicular blade by the user in Fluoroscopy will be maintained. However, if no change is made to the blade position in fluoroscopy then it will open to the cassette size in radiography.

Fluoroscopy with collimation in reduction (003)	Radiography (003)
	

Fluoroscopy (003)	Radiography (003)
	

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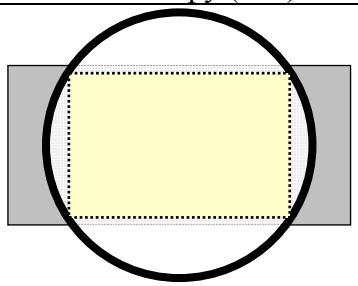
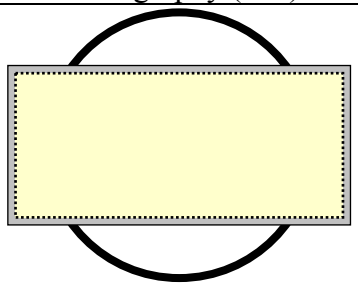
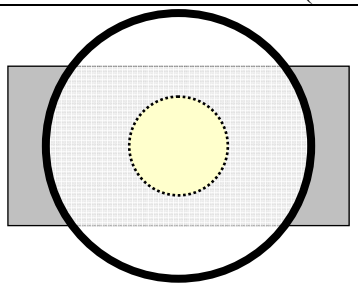
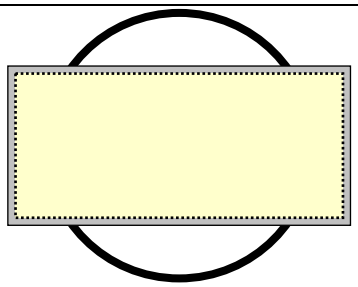
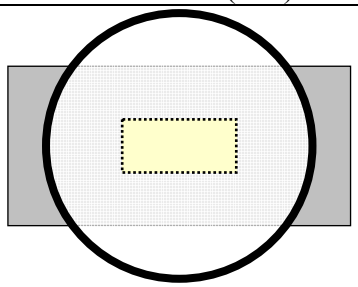
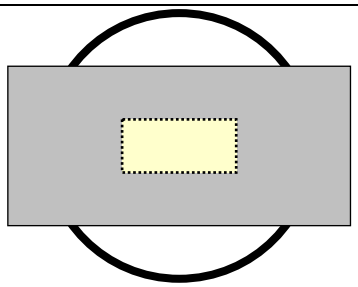
Setting 004: The iris blades collimation open always on the radiography selected film format and in addtion the iris collimation blades open in perpendicular format film selected in radiography if no collimated (the iris always open in radiography to the film format while the perpendicular diaphragm open in radiography to the film format only if it has not been collimated in fluoroscopy)

The parallel side will not move while the perpendicular side will not move only if controlled in reduction by the lever (61), while the iris is opening always on film format (maximum opening) even if controlled by the push button (50)

Fluoroscopy (004)	Radiography (004)
	

Fluoroscopy with the iris collimation in reduction (004)	Radiography (004)
	

Fluoroscopy with collimation in reduction (004)	Radiography (004)
	

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Bucky Collimation – push button (54) LED lit

53 **54**

In Radiography, the x-ray field will open to the size of the cassette (division).
If Fluoroscopy is commanded, the system will automatically switch to automatic or semi-automatic collimation mode, defaulting to whichever of the two modes was last active.

3.1.9.21. Stop in the horizontal position

55

This push-button **(55)** deactivates the automatic stop of the table in the horizontal position when tilting. This button can be disabled in Service Mode if deactivation of this stop is not permitted.

3.1.9.22. Stand vertical position

56

This push-button **(56)** restores the vertical position of the stand after the execution of oblique incidences. The LED will be lit when the stand and SFD reach the vertical position.

3.1.9.23. Longitudinal tabletop displacement

57 **58** **59**

- The lateral push button (57) moves the table top towards left side.
- The lateral push button (59) moves the table top towards right side.
- The central push-button (58) is used to place the tabletop in its original centered position. The LED will be lit when the table reaches the centered position.
- If the tilting angle is 0° the maximum tabletop head side travel is 86 cm.
- If the tilting angle is different from 0° the maximum tabletop head side travel is 47.5 cm.
- The maximum tabletop feet side travel is 15 cm.

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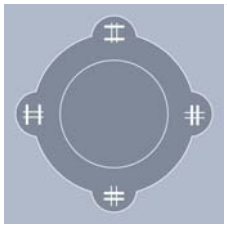
In accordance with regulations on minimum space between moving equipments parts, when the table is tilted to the vertical position (+/- 87°/90°) the minimum distance between patient tabletop and the floor must be at least of 120 mm. The minimum distance between the tabletop and the floor can be reached by repeatedly pressing the lateral push button.

3.1.9.24. Cassette IN/OUT

60

This push-button **(60)** alternately controls the entrance of the cassette holder in the SFD and its exit. The LED will be lit when the cassette holder is exiting.

3.1.9.25. Diaphragm collimation



61

By means of the joystick **(61)** it is possible to open and close the internal collimator diaphragms.
Push the lever up to open the longitudinal diaphragms and down to close them.
Push the lever left to open the transversal diaphragms and right to close them.

3.1.9.26. Compressor

62a **62b**

The table is equipped with a motorized compressor enabling the pre-adjustment of the compression pressure. The compressor movement is activated by pushing the button **(62a)** and **(62b)**

- Push the button (62a) to lower and activate the compressor
- Push the button (62b) to raise the compressor

As soon as the compressor reaches the bottom position the following movements will be inhibited:

- tabletop transversal displacement
- tabletop longitudinal displacement
- Stand and spot film device (mobile area) longitudinal displacement
- Stand inclination or centring
- Focal distance decrease

Selecting tomography will result in the automatic ascent of the compressor.

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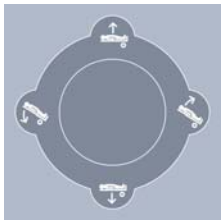
3.1.9.27. Tilting and elevation movement



63

Table tilting is controlled by joystick **(63)**.
The speed of the tilting movement varies according to the degree of joystick inclination.
When the motion approaches the maximum travel, the tilting speed will automatically gradually decrease in order to avoid an abrupt stop. Even if the control is released suddenly the movement will stop smoothly.
Tipping the joystick to right will move the table toward the vertical position.
Tipping the joystick to the left will move the table toward the Trendelenburg position.
With the elevation option, tip the joystick up to elevate the table and down to lower the table.

3.1.9.28. X-ray tube stand angulation

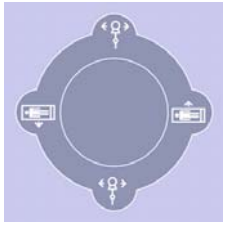
64a **64b**

The tube stand can be inclined up to an angle of +40° /- 40° using the push button **(64a** and **64b)**.

- Push (64a) to move the X-ray tube stand to the left with subsequent rotation of the tube for the execution of left oblique incidences.
- Push (64b) to move the X-ray tube stand to the right with subsequent rotation of the tube for the execution of right oblique incidences.

***NOTE**:*
It is possible to simultaneously drive the tube angulation and longitudinal scanning.

3.1.9.29. Control of the patient scanning movements



65

The control of the longitudinal and transversal patient scanning is activated by joystick **(65)**.
The movement speed varies according to the degree of joystick inclination.
The movements are such that anatomical correspondence is obtained with respect to the image on the monitor.

- Tipping the joystick to the right will move the tabletop the internal side, corresponding to right side of the image on the monitor.

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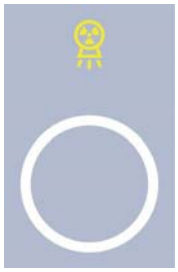
- Tipping the joystick to the left will move the tabletop the external side, corresponding to left side of the image on the monitor.
- Tipping the joystick up will move the I.I.-Tube Stand group to the left, corresponding to the top of the image on the monitor.
- Tipping the joystick down will move the I.I.-Tube Stand" group to the right, corresponding to the bottom of the image on the monitor.

ATTENTION:
on request it is possible to invert the behaviour of the joystick:
tipping the joystick up will move the I.I.-Tube Stand group to the right;
tipping the joystick down will move the I.I.-Tube Stand" group to the left.

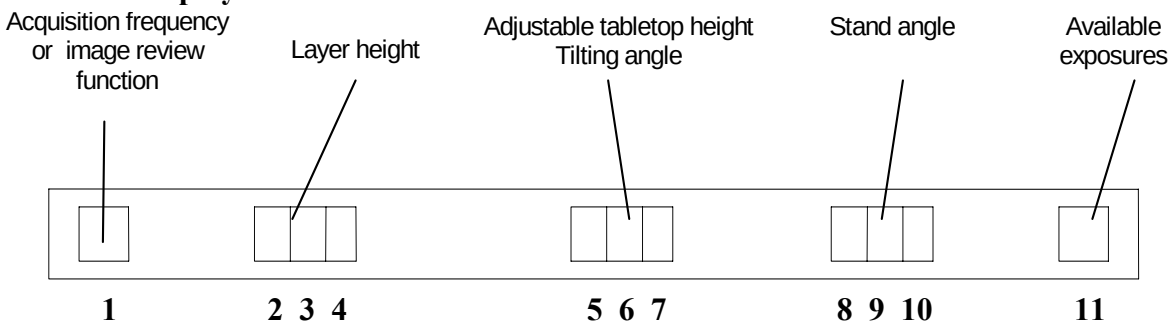
3.1.9.30. X-ray exposure



66

The command of the X-ray exposure is achieved with a two-position push-button **(66)**.
The first position of the push-button enables the Radiography Preparation, while the second position (deeper) enables the X-ray or Tomographic exposure.
With tomography function activated, the Radiography Preparation controls tube stand and spot film device movement (dead man function); when the push button is released the equipment movement will stop.
If aradiography is started and not completed it will be necessary to replace the film and repeat radiography.

3.1.10. Console Display



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3.1.10.1. Acquisition frequency or review image function

The display (**1**) displays the following information:

- Indicates a movement inhibit when there is an external limitation (ceiling, floor, walls etc.).
- For an analog system displays the number related to the acquisition function or image review.

This display is inhibited when an error code or power off occurs.

3.1.10.2. Error codes/equipment condition and display of layer height

The display (**2,3,4)** displays a series of data according to the selected function:

1) Errors codes:

Error code **97** is displayed when the equipment is switched on and a push button or joystick has been pushed or faulted. If this occurs:

- Use push button (55) to reset the error code (97)
- Verify all table movements and all push button and joystick functionality.

2) Layer height:

In tomography, displays the layer height in millimeter on the patient tabletop (adjustment of the layer height from 0 to 330 with increase-step of 1 millimeter)

3.1.10.3. Tilting angle and table elevation

The display (**5,6,7**) displays the tilting angle or elevation.

- If the tilting angle is zero, the millimeters of elevation will be displayed (if elevation option is present)
- When a cassette is inserted the perpendicular size of the cassette can be displayed by pushing the cassette division push-button.

This display is inhibited when an error code or power off occurs.

3.1.10.4. Tube stand angulation

The display (**8,9,10**) displays the following data according to the selected function:

- The tube stand angle
- The selected tomography angle
- When a cassette is inserted the parallel size of the cassette can be displayed by pushing the cassette division push-button.

This display is inhibited when an error code or power off occurs.

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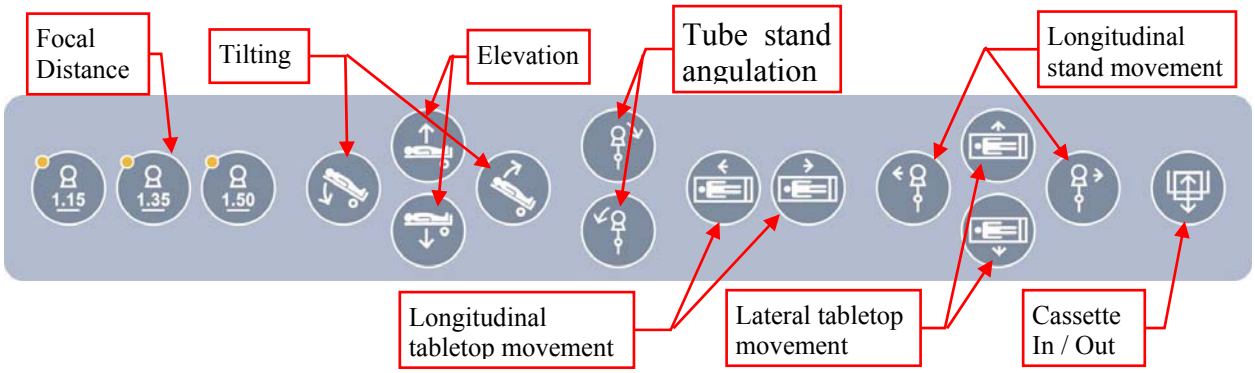
3.1.10.5. Available exposures

The display **(11)** indicates the number of available exposures and will switch off if the cassette tray is not loaded or ejected from the table.
This display is inhibited when an error code or power off occurs.

3.1.11. Tableside controls



Certain functions are available on the tableside control panel located on the front cover of the Spot Film Device. For those functions that are duplicates of those on the positioner console only brief descriptions are provided below; see the section pertaining to the same control on the positioner console for complete details.

3.1.11.1. Focal Distance Selection (Source – image distance setting)

Allows the operator to drive toward three different focal distances; should the operator release the push-button before the exact focal distance on the push-button is reached the three LEDs will blinks.

3.1.11.2. Tube Stand Angulation

Allow tube stand angulation to a maximum of 40°.

3.1.11.3. Tilting and Elevation

Commands table motion: the push-button on the left controls the table's displacement towards the horizontal position or Trendelenburg; the push-button on the right controls the table's displacement towards the vertical position. With the elevating option the push-button at the top elevates the table and the push-button at the bottom lowers it.

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3.1.11.4. Patient scanning (lateral tabletop movement)

Controls the patient scanning through the displacement of the "Stand/SFD" group (push-buttons on the left and on the right) and through the transversal displacement of the tabletop (push-buttons on top and bottom).

3.1.11.5. Patient scanning in longitudinal position – optional

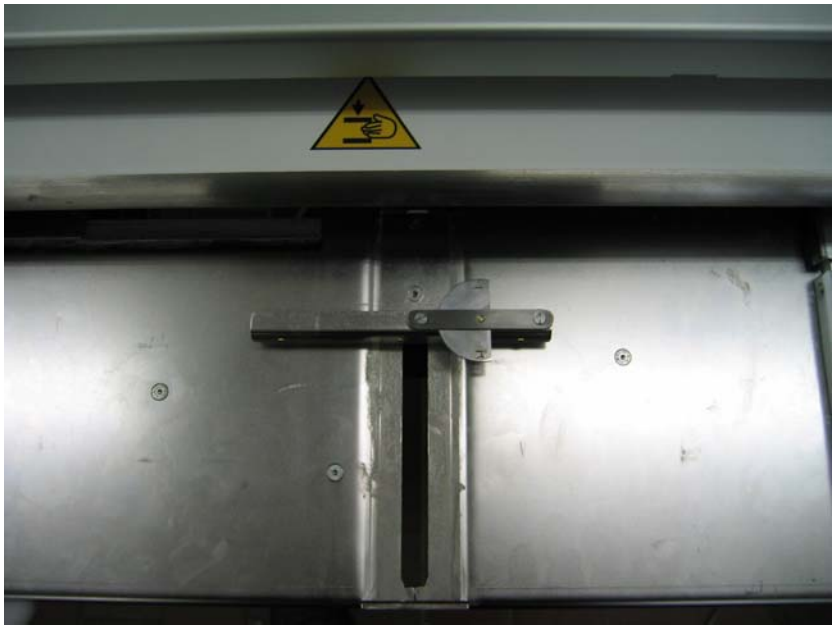
Controls the longitudinal displacement of the tabletop.

3.1.11.6. Cassette IN/OUT

Alternately commands the IN and OUT movements of the cassette-holder.

3.1.12. Cassette holder left and right device

Inside the spot film device cassette holder there is one film marker device. The device will mark the film with the L symbol (for left side) or R symbol (for right side) in order to indicate the patient body part side. The activation of the marker device is manual.



An optional marker for France is provided and must be installed on site.

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3.1.13. Optional on board console with joystick

The joystick controls the patient scanning through the displacement of the "Stand/SFD" group (by tipping the control lever towards left or right) and through the transversal displacement of the tabletop (by tipping the control lever towards up or down).
The movements were programmed so that anatomical correspondence is obtained compared with the image on the monitor.

- Tip the lever to the right and the tabletop will move towards the internal side, corresponding to the right side of the image on the monitor.
- Tip the lever to the left and the tabletop will move towards the external side, corresponding to the left side the image on the monitor.
- Tip the lever up and the I.I.-Tube Stand group will move left along the longitudinal axis, corresponding to the top of the image on the monitor.
- Tip the lever down and the I.I.-Tube Stand group will move right along the longitudinal axis, corresponding to the bottom of the image on the monitor

During the patient longitudinal scanning (head-feet and vice versa), if the spot film device and stand group has reached the end of stroke and you are still going on tipping the lever toward the same direction, the tabletop will start moving on the opposite side from the scanning movement.

WARNING:
on request of the equipments operator, it is possible to reverse the SFD and column movement by modifying the console the cabling of the console on the table harvests.

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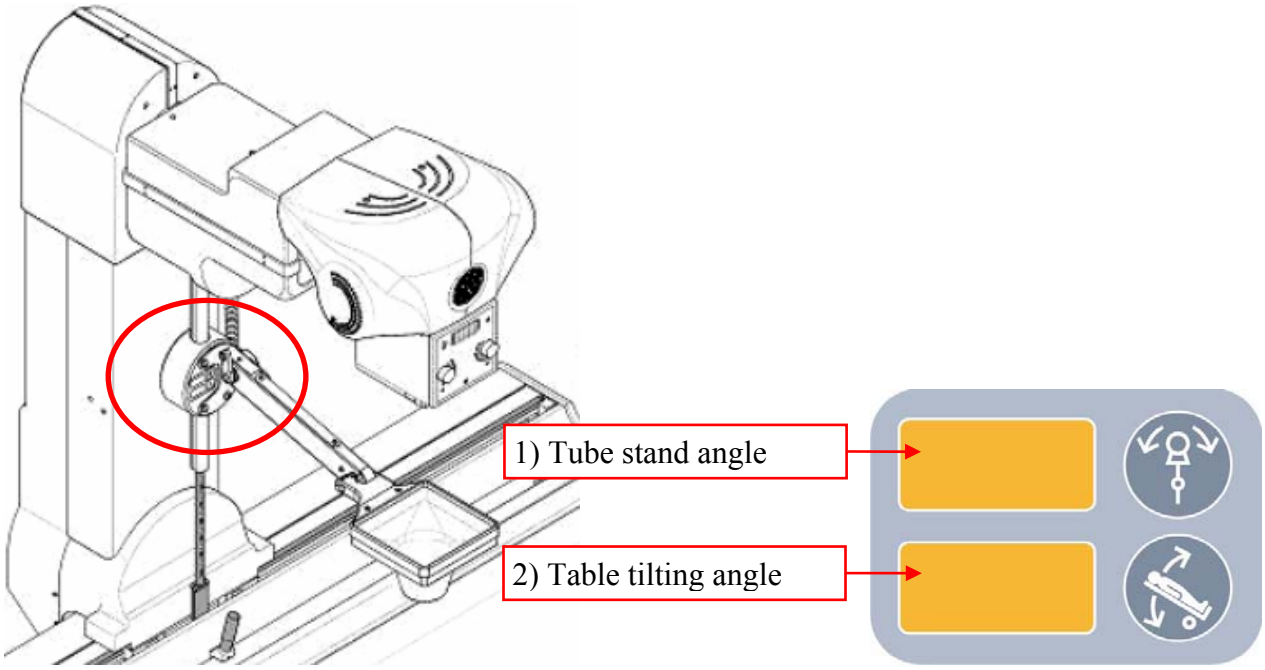
3.1.14. Compressor display



Compressor display

The compressor display contains the following data:

1) The top display is the tube stand angle; during the tomographic exam it will display the tomographic angle
2) The bottom display is the tilting angle

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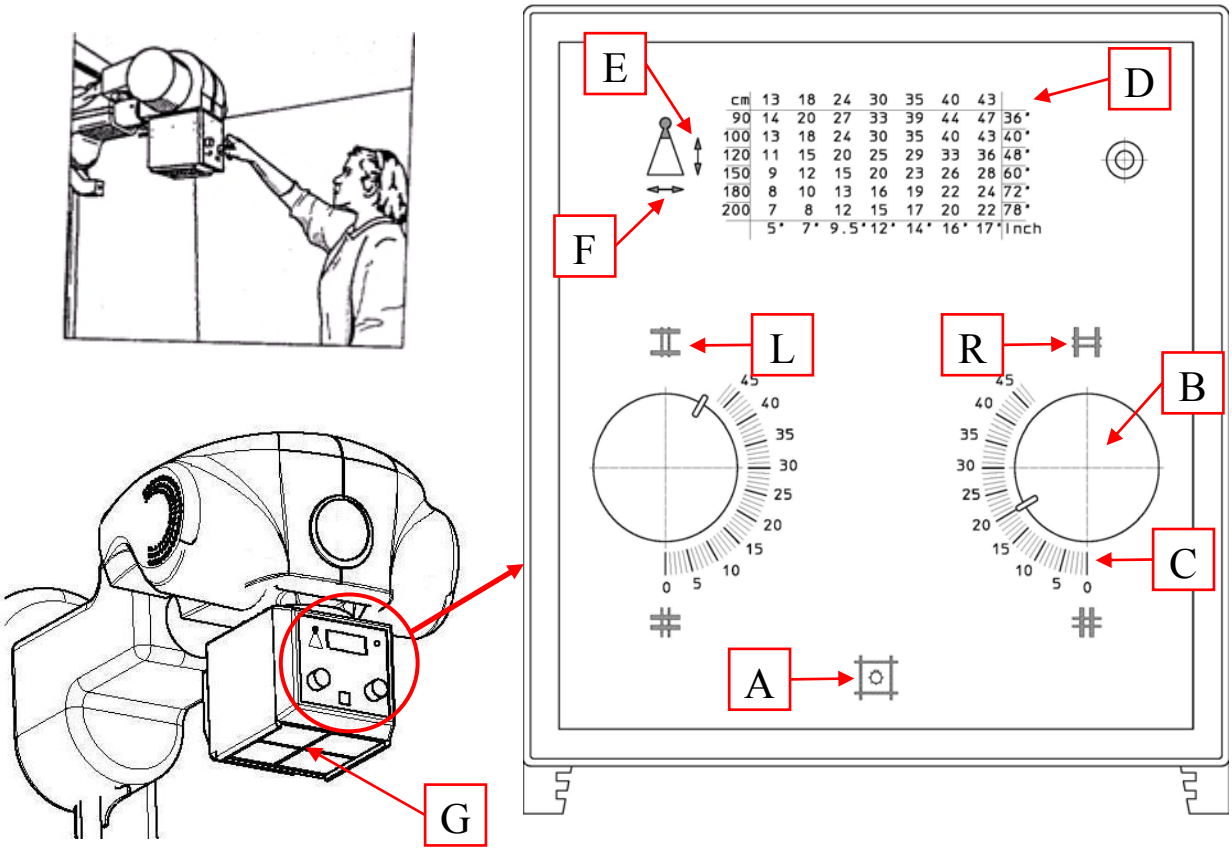
3.1.15. Table collimator

3.1.15.1. Turning on the luminous beam

Press push-button (**A**) on the collimator:
The luminous beam will remain lit for 30 seconds to show the dimension of the X-ray field. It will switch off automatically.
The cross-hairs **(G)** indicate the position of the field center.
Average illumination is not less than 160 LUX; edge contrast ratio is minimum four to one.



Collimator provided with control devices for the manual limitation of the X-ray field

3.1.15.2. Limiting the X-ray beam field

Turn the adjustment knobs (**B**) on the collimator:

- The knob on the left (L) commands the diaphragms in the width direction (parallel diaphragm); turn clockwise to close them and counter-clockwise to open them.
- The knob on the right (R) commands the diaphragms in the height direction (perpendicular diaphragms): turn clockwise to close them and counter-clockwise to open them.

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3.1.15.3. DFR Technique

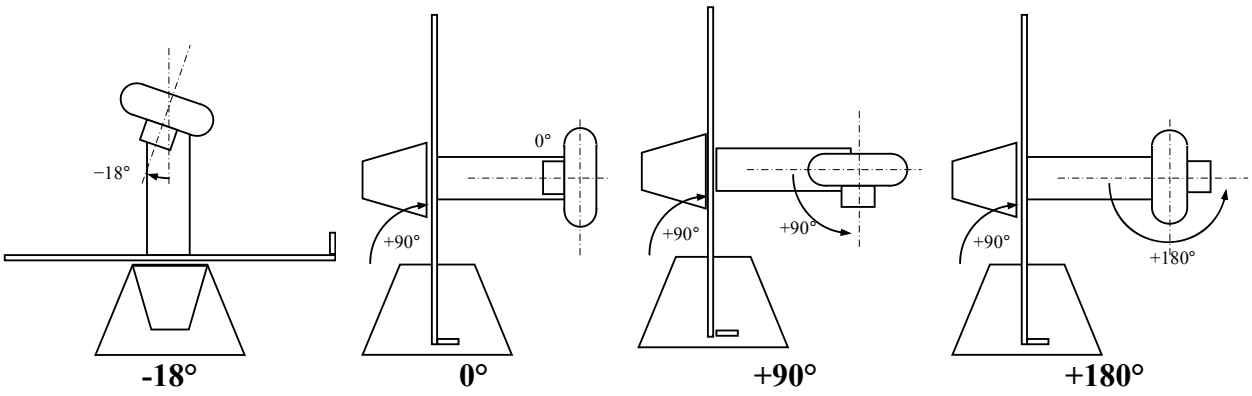
This technique is present if the DFR push button (**14**) is selected.
It is possible to change the X-ray field within the limits of the I.I. magnification size that was previously selected by means of the push-buttons (**1, 2, 3, 4**).

3.1.15.4. X-ray cassette technique

- Around each adjustment knob (B) there is a graduated scale (C) used to indicate the field size setting.
- The table on the front panel (D) shows the settings for various focal distances. Find the row containing relevant focal distance in the far left (cm) or right (inch) column and the column containing the desired field size in the top (cm) or bottom (inch) row; the intersecting value is the corresponding collimator field size setting.
- Move the knob to the position on the scale for the field size setting found.

3.1.15.5. X-ray field adjustment for "External Radiographs"

To place the collimator in manual mode rotate the tube to the ±18° / ±72° / ±90° / +180° position or do not insert a cassette in the cassette tray.



Follow the same above-specified procedure. You can modify the X-ray field up to the mechanical limits of the adjustment area of the collimator.

WARNING:
If you rotate the tube or use the accessory provided for External Radiographs the radiation beam will extend beyond the primary protective shielding.

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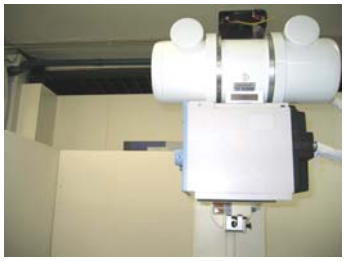
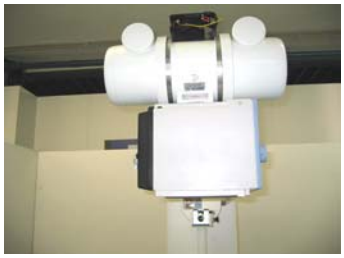
3.1.15.6. Collimator manual rotation (+ or - 90°)

It is possible to rotate by hand the collimator to ± 90°



Collimator rotated to left side

Centered collimator



Collimator rotated to the right side

3.1.15.7. How to insert filters below collimator

If necessary, it is possible to insert filters below the collimator, as shown in the following picture.

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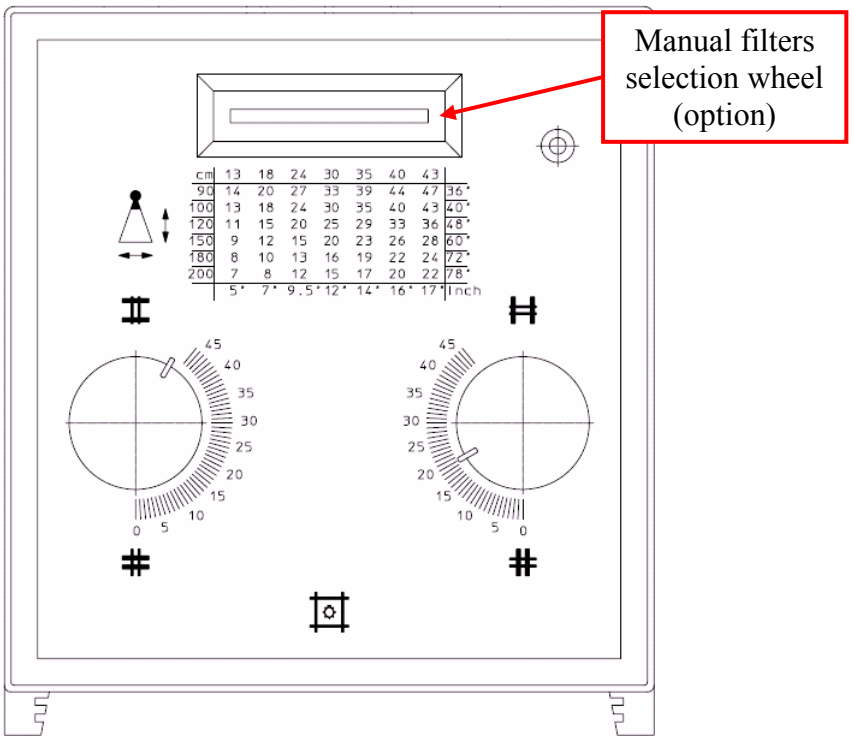
3.1.15.8. Collimator type

There are three different collimator versions: the first and standard version has a square field, the second version includes the optional iris and has a square and round field, the third version includes the iris, has a square and round field and it is equipped with manual filters.

***NOTE**:*
for further details about collimator types, please refer to their respective manuals.

The collimator version with iris, square and round field and manual filters is shown in the following picture.



ATTENTION:
This collimator with manual filters option can not work with "Air Kerma" calculation algorithm.
The "Air Kerma" calculation algorithm has no information regarding the selected filter.

The manual filters enable to obtain the following additional filtrations for the X-Ray field:

0 mm Al
1.0 mm Al + 1.0 mm Al
0.1 mm Cu + 1.0 mm Al
0.2 mm Cu + 1.0 mm Al

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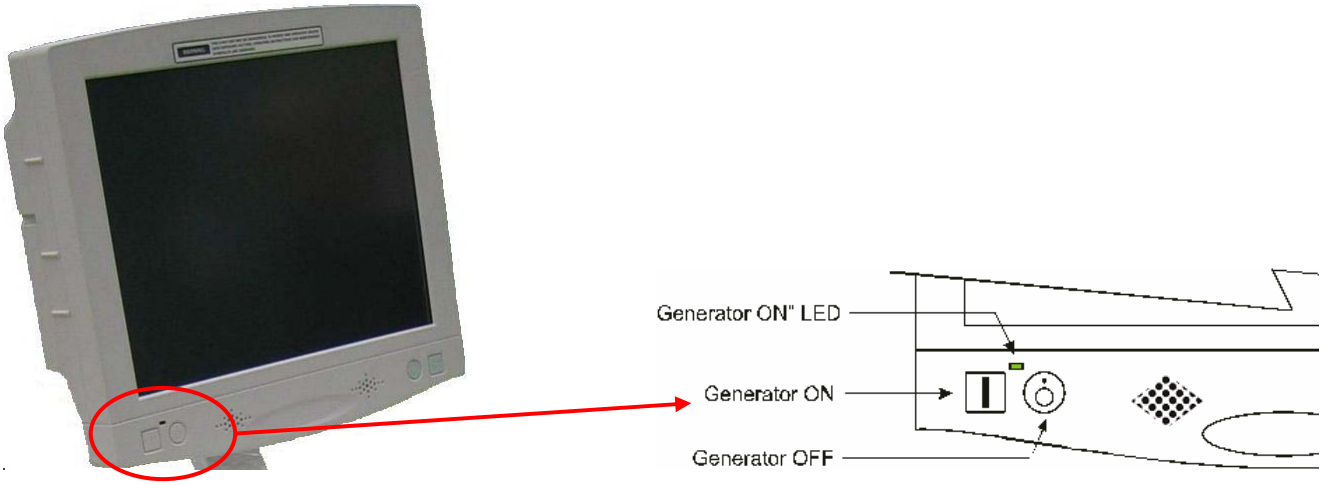
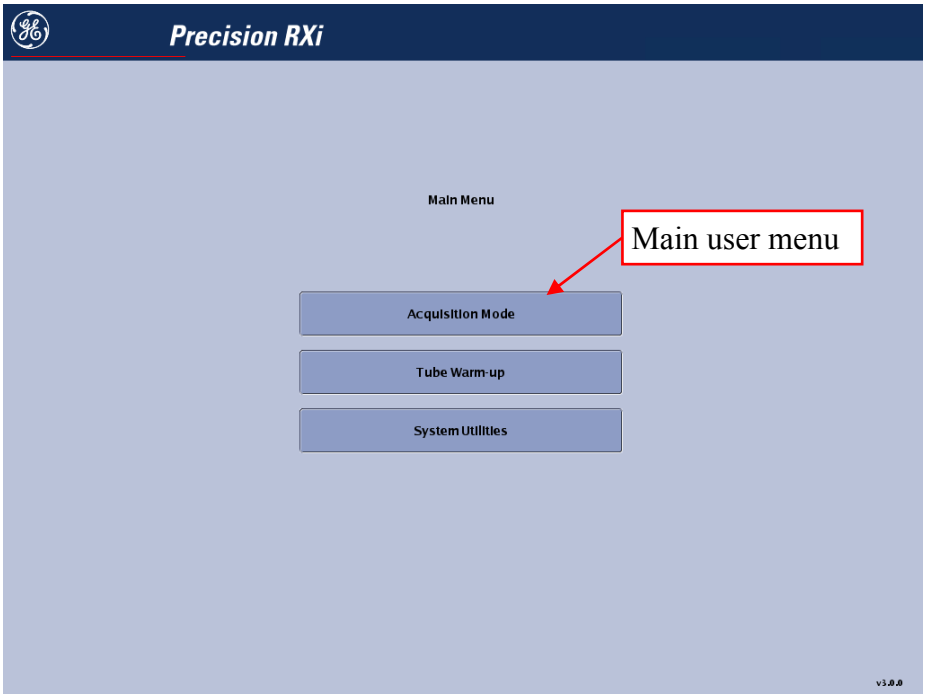
3.1.16. Generator console overview



3.1.16.1. Power up Main Menu



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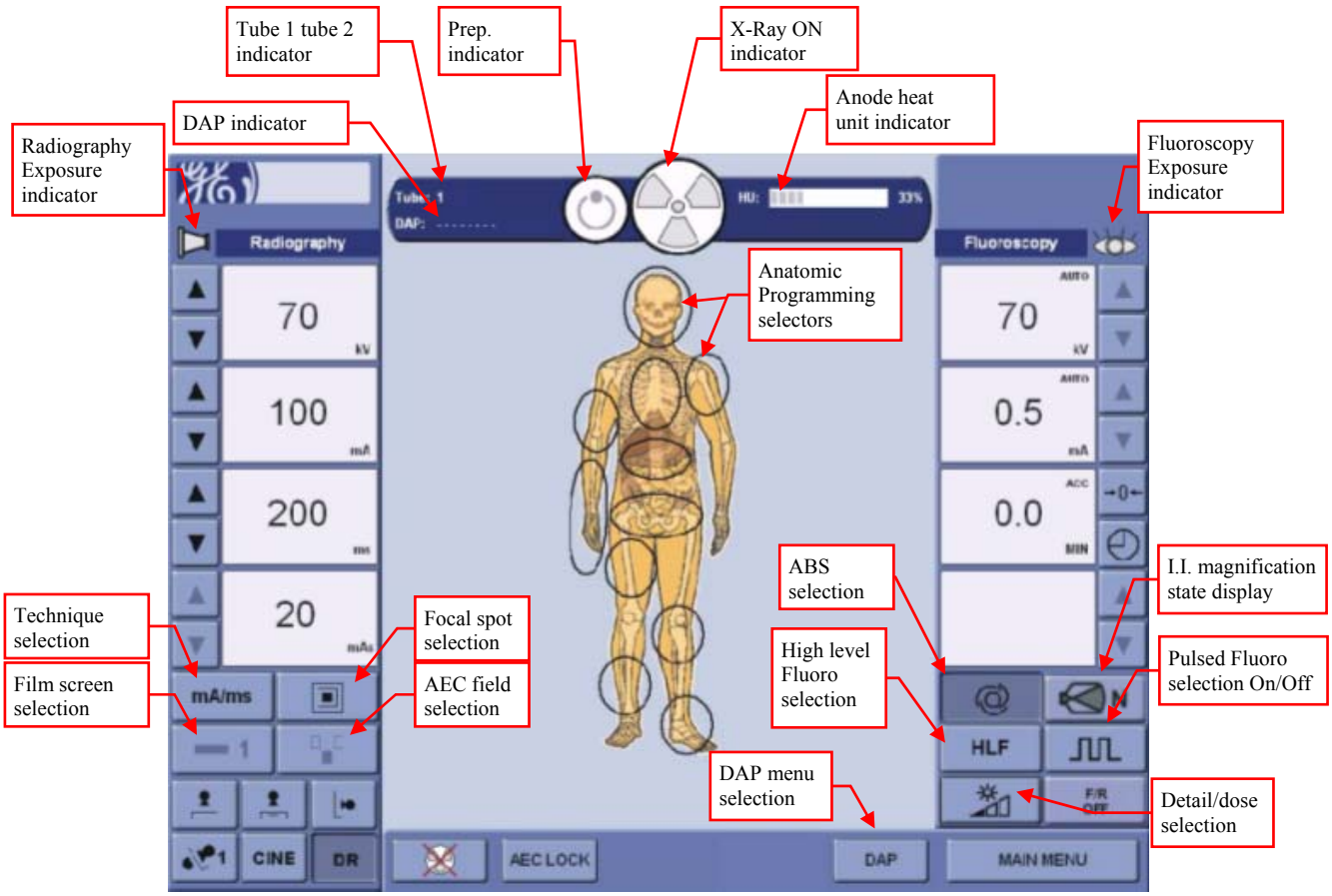

See section 4 “Getting started”.

3.1.17. Generator Duty Cycle Limit

NOTE:
The following section contains important information. Please read and understand this material before continuing.

Internal X-ray generator components will heat up during normal use of the generator. This is similar to X-ray tube heating during normal generator operation. The amount of heat produced is proportional to the product of kV, mA, and time

Modern X-ray generators are designed to operate with the majority of X-ray tubes over their rated power ranges. They are designed for operating duty cycles **consistent with practical patient examination routines that allow for reasonable cooling intervals between X-ray exposures**. Insufficient cooling time between exposures may lead to excessive heat build-up in the generator, which may cause serious generator damage.

This X-ray generator has internal duty cycle monitoring to warn of excessive heat build-up. If the generator calculates that the next exposure will exceed the rated generator duty cycle limit, a warning message “Generator duty cycle warning” will be displayed. Exposures will not be inhibited when this

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message is displayed, but it should be understood that continuing to make exposures might cause generator damage due to overheating. If possible, the generator should be allowed to cool sufficiently such that this message is no longer displayed.

3.1.18. Digital system interface overview

The "F" keys at the top of the Keyboard can be used to Shortcut to certain system functions.

The system is shipped with the following function-key default settings:

Key	Function
F1	User Manual
F2	Patient List
F3	Close Patient
F4	Toggle Acquire
F5	Acquire Subtracted
F6	Fluoro Loop
F7	Review Mask
F8	None
F9	Store Reference
F10	Status Dialog
F11	Full Screen
F12	Thumbnails

These keys can be customized in the Service Mode.

***NOTE**:*
A function key overlay will be provided with your system. This overlay reflects the default settings. If the settings are changed, please remove function key overlay from the keyboard.

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3.1.18.1. Pointing Device

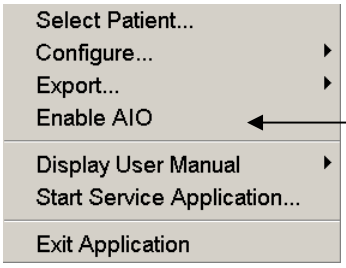
The Pointing device (typically a trackball) is used to control the Graphic User Interface (GUI) including:

- Cursor Movement (cursors are detailed in part 3.1.18.6 of this section)
- Single-click selection on menus and screens
- Double-click selection on menus and screens
- Select and Drag items on screens
- Right click selection for alternate menus and screens (see section 3.1.18.2).

3.1.18.2. Right-Click Menu

To access this menu, click the right mouse button while the cursor is over the main image area. This function is operational in either the *Review* or *Acquisition* mode.

NOTE:
User can bring up the standard Right click menu only when no image is replaying



Standard Right-Click Menu

Enable AIO is optional and only will appear on the menu if AIO has been configured in Doctor Preferences (Spot) and you are currently viewing a *Spot* image.

Menu Option	Display	Functions
Select Patient...	Will jump to the *Patient List* screen	Useful way to go to Patient List screen in order to open new patient, edit patient information, open Worklist, DICOM or Media Import, check status of study, etc.
Configure.. ▸	Doctor Preferences Current Doctor Prefs Programmable Sequences Sequence Titles Annotation Presets	Quickly change Doctor Preferences, Sequence Titles and Annotations presets. If a patient is open, "Doctor Preferences" is grayed out, and "DISPLAY LUTs" is normally shown at the bottom. Doctor Preferences Current Doctor Prefs Programmable Sequences Sequence Titles Annotation Presets Display LUTs

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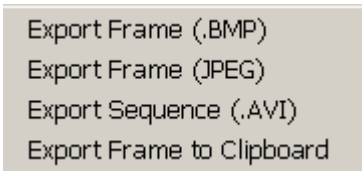
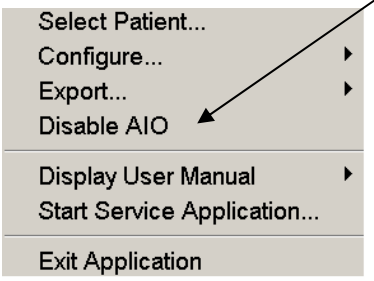
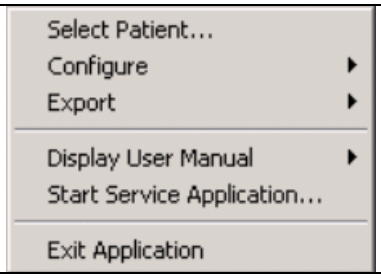
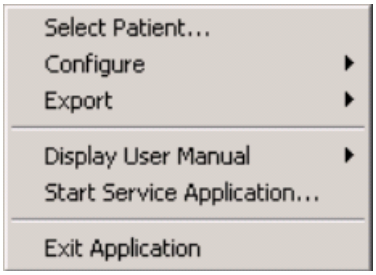
Menu Option	Display	Functions
Export...		Save patient images as bitmap, jpeg or AVI format. Additionally, can copy an image to the clipboard for insertion in document or web page. See Section "09_Import-Export" for details. **NOTE**: This button is accessible only when saved image is displayed.
Enable AIO or Disable AIO		**NOTE**: This button is available only when image was acquired with AIO Configured, and during viewing of a Spot image. If image was acquired with AIO in Doctor Preferences (Spot), additional text will appear on the right-click menu – Enable or Disable AIO. Refer to Section 5.2.4.3 for additional information about this feature. **NOTE**: if image was not acquired with AIO, the Enable/Disable AIO button will not appear on the right click menu.
Start Service Application..	Closes current patient (if open) and then closes clinical application.	You will be prompted for a login and password if current user is not authorized. When correct login and password is entered, the service screen is displayed.
Display User Manual		Select desired chapter of the manual and it will open in Adobe® Acrobat .pdf format. When done with Manual, close window. System will return to System screen. Any open clinical images remain available and unaffected.
Exit Application		Click to exit clinical application as part of normal shutdown procedure. If a patient file is open, the system will prompt you to confirm closing of the patient file. The system will also prompt for confirmation of action to exit the application.

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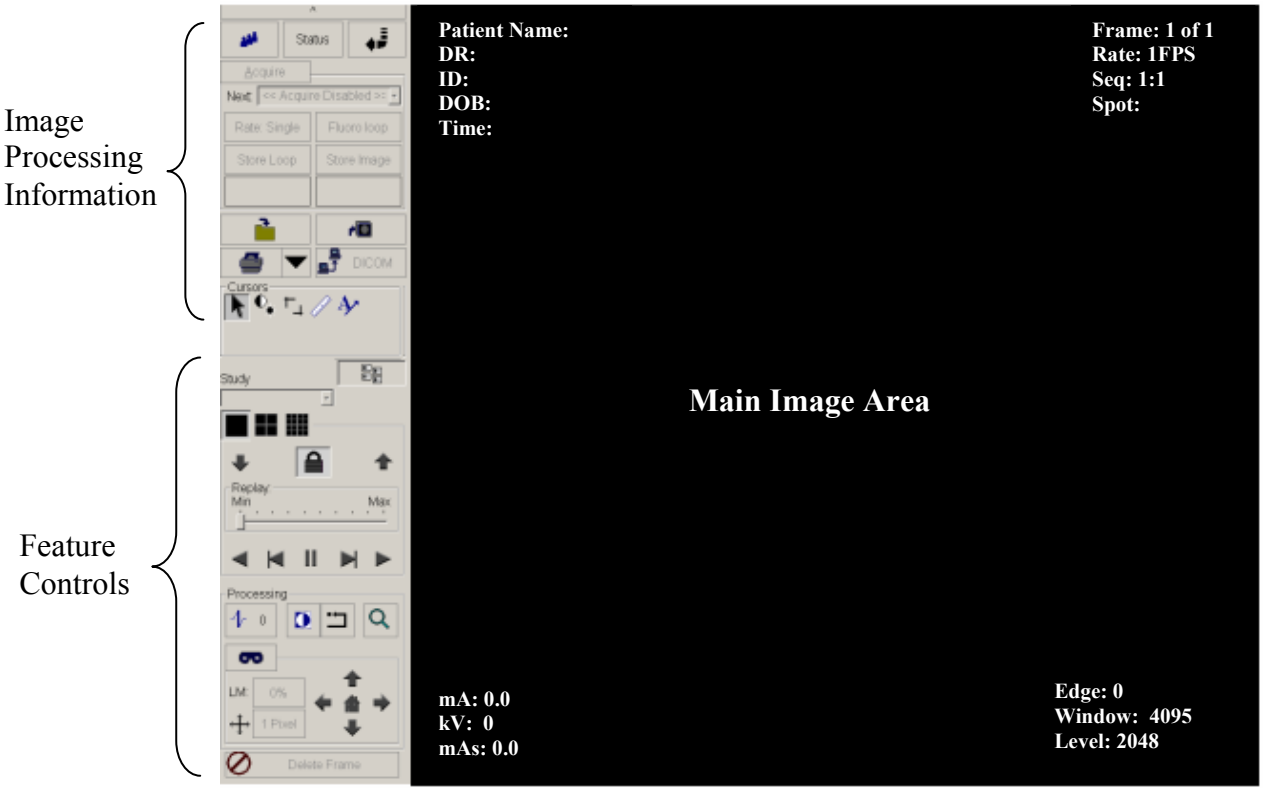
3.1.18.3. Digital system graphical User Interface (GUI)

The *Precision RXi* uses a Graphical User Interface (GUI) based on a series of menus shown on an Image Monitor.

Menus may appear anywhere on the screen including over the image portion. Typically, menus do not interfere with normal image viewing.

Interaction is achieved through the use specific icons (small pictures), text buttons, pull-down menus, and sliders.
Here is a typical screen. Note the information onscreen indicating dose levels, rates, and enhancements applied.



User Interface

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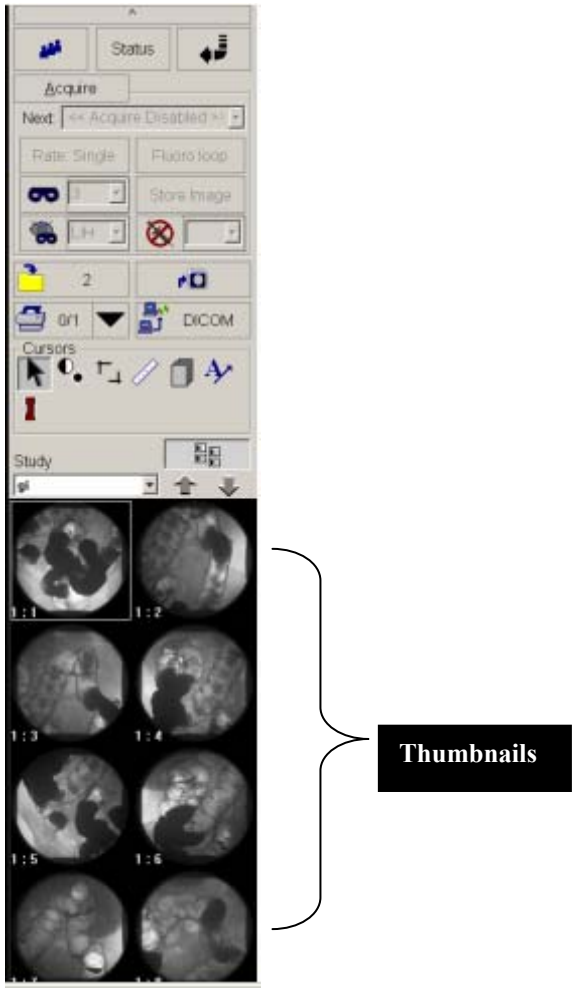
3.1.18.4. Thumbnails

A Thumbnail is a miniature picture of an actual clinical image or the first image of a Sequence. It is a quick means by which to identify and select from numerous available singe shot or Sequence images.

Left click on a thumbnail image to display the full-sized image in the main image area.

For more detailed information on this feature, refer to Section “7 Reviewing Images” of this manual.



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3.1.18.5. Buttons and Sliders

There are several different types of controls used in the screens.

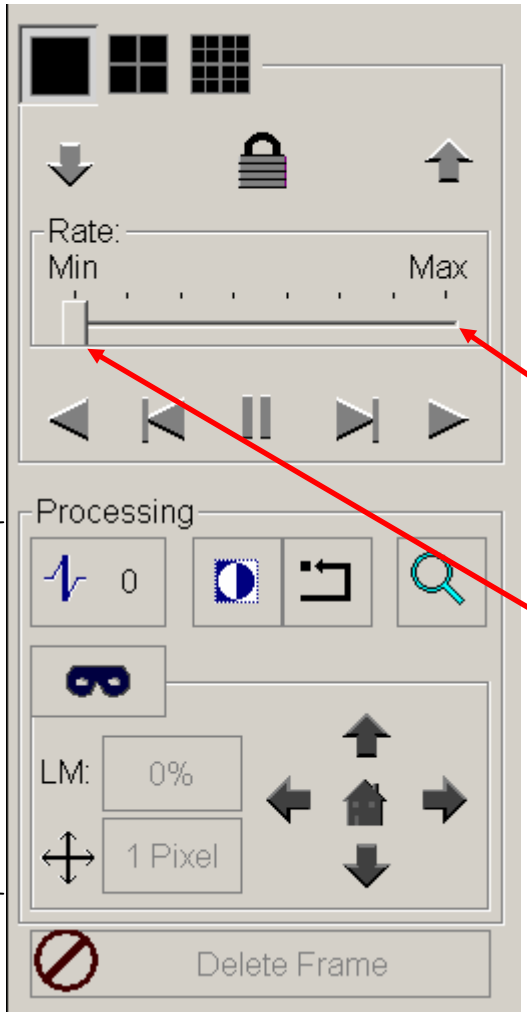
Image Processing Buttons

Toggle buttons turn a feature ON/OFF.

The button usually changes in appearance when it is selected.

Symbols, also called Icons, are meant to illustrate the function of the specific button.

Some other buttons cycle through the available settings each time the button is selected.



Sliders

Sliders allow for rapid change for a feature. A marker indicates the current position of the setting.

Position the cursor over the slider marker.

Click and hold the left button on the Pointing device to select the marker, and then move the marker along the slider to adjust the setting.

Sample Controls and Buttons

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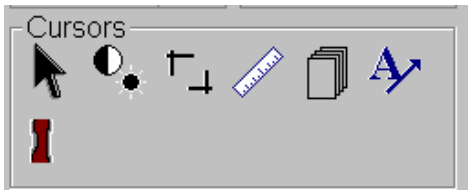
3.1.18.6. Cursors

The *Precision RXi* Graphic Interface almost always uses a **cursor** - a small picture representing the position of the pointing device relative to the screen. Selecting a different cursor allows quick modification of a feature using just the cursor.

Click on the desired cursor in the *Cursors* area of the screen, and then position the cursor over the image.

- When selecting the cursor, do not drag the cursor, just click and move the mouse.
- Once over the image, click and hold-down the left mouse button – this is called dragging – in the direction needed.
- See chart below for full descriptions.



Cursor	Used For	Move Cursor….
	Restoring Standard Cursor	Click to revert to standard cursor
	Adjusting the amount of brightness and/or contrast shown for the image.	Move this cursor to the image display area and "drag" the cursor vertically (up to increase brightness; down to decrease brightness) or horizontally (left to increase contrast; right to decrease contrast) See *Section 7–6 Adjust Brightness/Contrast* for detailed instructions on this feature.
	Manually applying or adjusting shutters	Use the cursor to select any edge of the image and drag the selected shutter to the desired position. See *Section 7–10 Manual Positioning of Electronic Shutters* for detailed instructions on this feature.
	Measurement Functions on an image	Click to activate Measurement tool bar. See *Section 10 Measurement Tools* for detailed instructions on this feature
	Add/Edit Annotations on an image	Click to activate Annotation Features See *Section 7–12 Annotations* for more detail.

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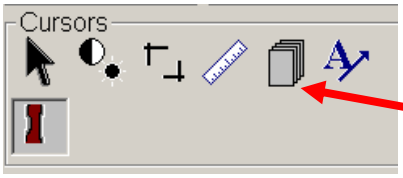
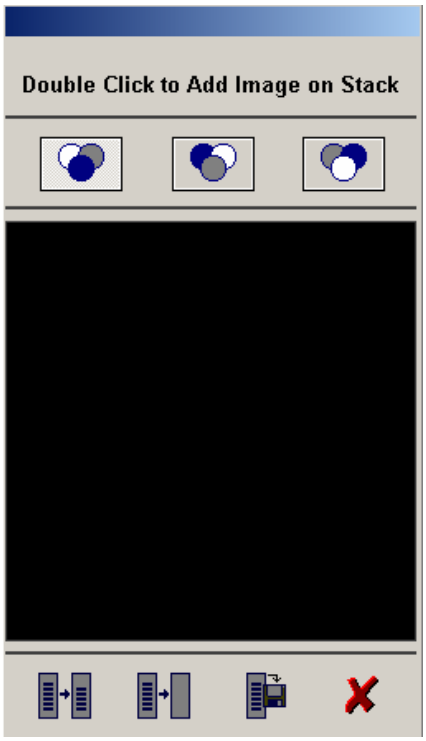
DSA ONLY 	**Image Stacking** 	Start Stack Processing – click to display function window:  Reference Section 7 – Reviewing Images: 16-Image Stacking for more detail
	QCA Processing 	Precision RXi offers a software feature that allows for the measurement of the size of the vessel in order to determine the width and length of the stenosis. Using the catheter as a calibration reference, an accurate measurement can be made of the size of the vessel in order to determine the size of the balloon or stent to be used.

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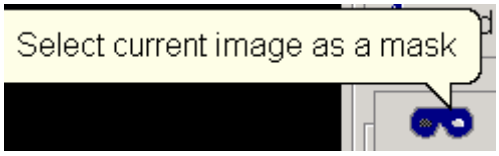
3.1.18.7. Tool Tips

When the Cursor is positioned over an icon, a Pop-up Description will display. The Pop-up provides a description of the function that is represented by that icon. There is no need to click or select anything just move the cursor over the icon/button.

The pop-up will disappear when the cursor is moved away from the icon. Icons that are currently unavailable for selection will not display tool tips.

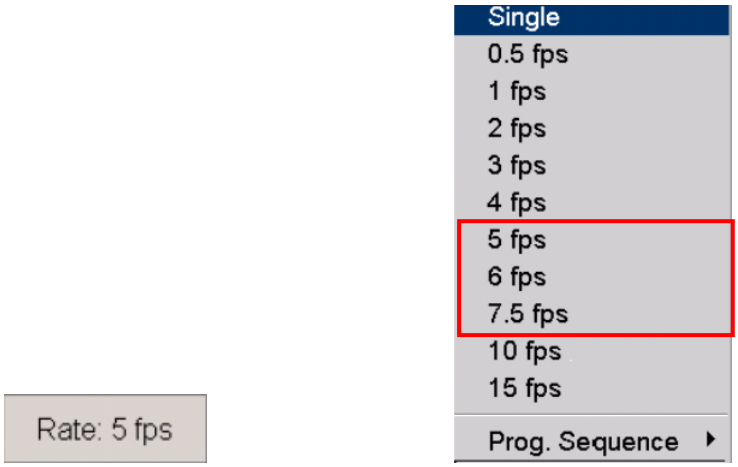
Here is a sample for the mask icon.



Sample Tool Tip (Showing the mask icon)

3.1.18.8. Rate Selection

The user can select a Rate by clicking the *Rate* button on the *Main GUI, or Processing Panel.* When this button is clicked, a *Drop-down List* box displays.



Choosing another *Rate* on the Shutter *Drop-down List* box will *Exit* the *existing Rate*

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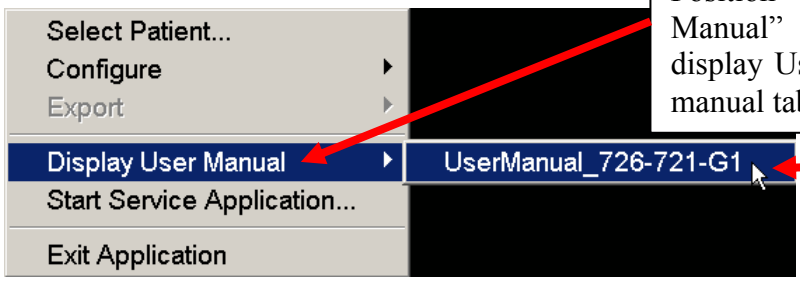
3.1.18.9. On-Line Manuals

The User manual is available for reference at any time from the main image screen through the right click menu. The manual is formatted in Adobe® Acrobat .pdf and can either be read on-screen or printed out for further study.

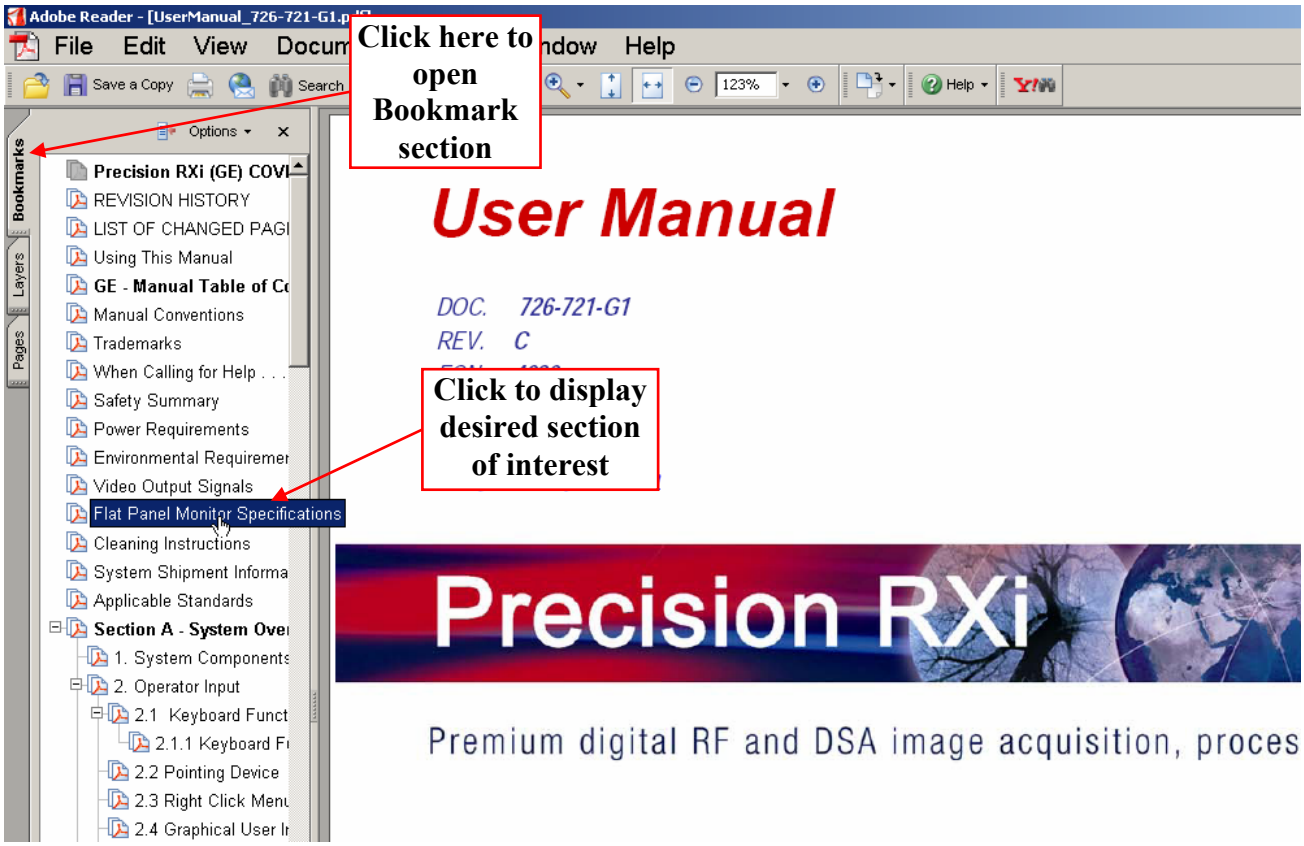
3.1.18.10. Accessing the Online User Manual

To access the online user manual, right click in the main image area. A submenu – the ***Right Click Menu*** will be displayed



Position the cursor over "Display User Manual" to highlight and then left click to display User Manual tab window. The Online manual tab window will be displayed

Position cursor over the "UserManual" menu option and then left click. The manual will open in Adobe® Acrobat .pdf format.



The selected section of manual will be displayed on the right side of screen.

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NOTE:
If the "Bookmarks" do not appear in the left section of the screen when the PDF is opened, place the cursor on the bold line running down the left side of the screen. The cursor, which had been a hand, will change in appearance.

Double click on the bold line on the left of the screen and the bookmark area will open up. If there is no listing shown in this area, click on the Bookmarks *tab. The listing should then appear.*

When you are finished working with the manual, close the window. The system will return to *Precision RXi* screen and any open clinical images remain available and unaffected.

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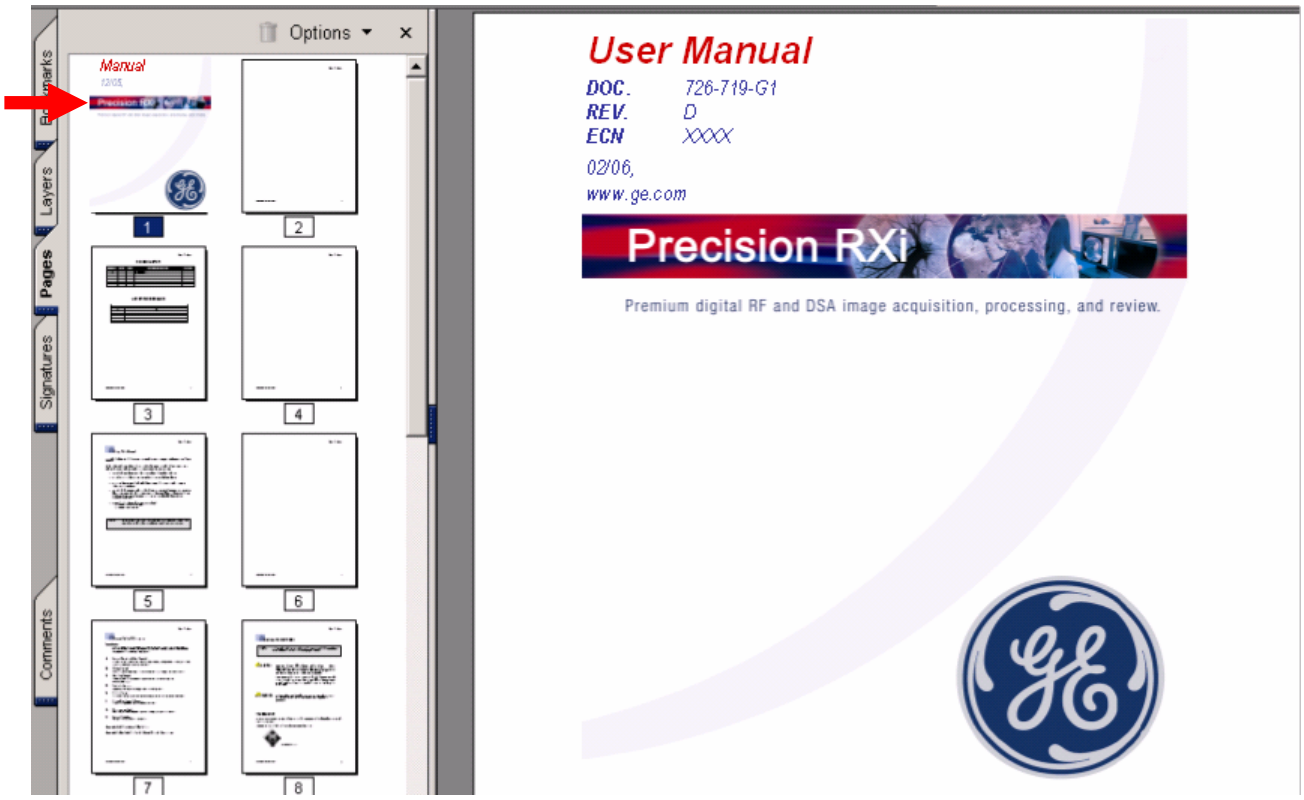
Adobe "Thumbnails"

Click on the Pages tab to view individual pages within a section. For full view of a selected page, click on that page.

Use the slider on the right side of the page to move the document up and down. Print manual pages by clicking on either the printer icon or the File button at the top of the page.

Select Print... and then follow normal procedure for printing documents.	



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3.1.19. OTS user interface

In the following picture, the control panel and collimator are shown. The handles are covered by synthetic rubber.

NOTE:
Use only the handles to move and position the ceiling suspension.

On the control panel there are brake control buttons and the display of focal distance and X-ray beam inclination angle.

Pos.	Description
01	Push button which unlocks the brake of the tube horizontal support arm rotation on the vertical axis
02	Push button which unlocks the brake of the tube longitudinal movement
03	Push button which unlocks the brake of the tube rotation on the horizontal axis
04	Push button which unlocks all linear movement brakes at the same time
05	Push button which unlocks the tube transversal movement
06	Push button which unlocks the tube vertical movement
07	Synthetic rubber handle
08	X-ray beam inclination angle indication
09	Focal distance display
10*	Collimator setting chart
11*	Control knob for regulation of the collimator shutter
12*	Control knob for regulation of the collimator shutter
13*	Push button control for lamp

* For the specific instructions, please to the documentation that comes with the collimator.

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3.1.20. Ceiling suspension collimator

3.1.20.1. Ceiling suspension manual collimator

The collimator enclosure is constructed of double steel walls for maximum X-ray protection. The collimator body contains 6 pairs of lead-lined shutters controlled by two knobs: two pairs of shutters are positioned near the focus, two near the entrance window and two near the exit window of the X-ray beam from the collimator to provide a sharply defined x-ray field. Shutter movements are manual.

Characteristics:

- External adjustment of mirror angulation.
- High luminosity provided by a quartz iodide lamp.
- Timer limiting projection lamp exposure time to 30 seconds thus extending lamp life and preventing overheating.
- 150 kVp radiation shielding.
- Minimum inherent filtration 1 mm aluminum equivalent.
- Continuous film coverage from 0 x 0 to 43 x 43 cm at 90cm FFD (SID).

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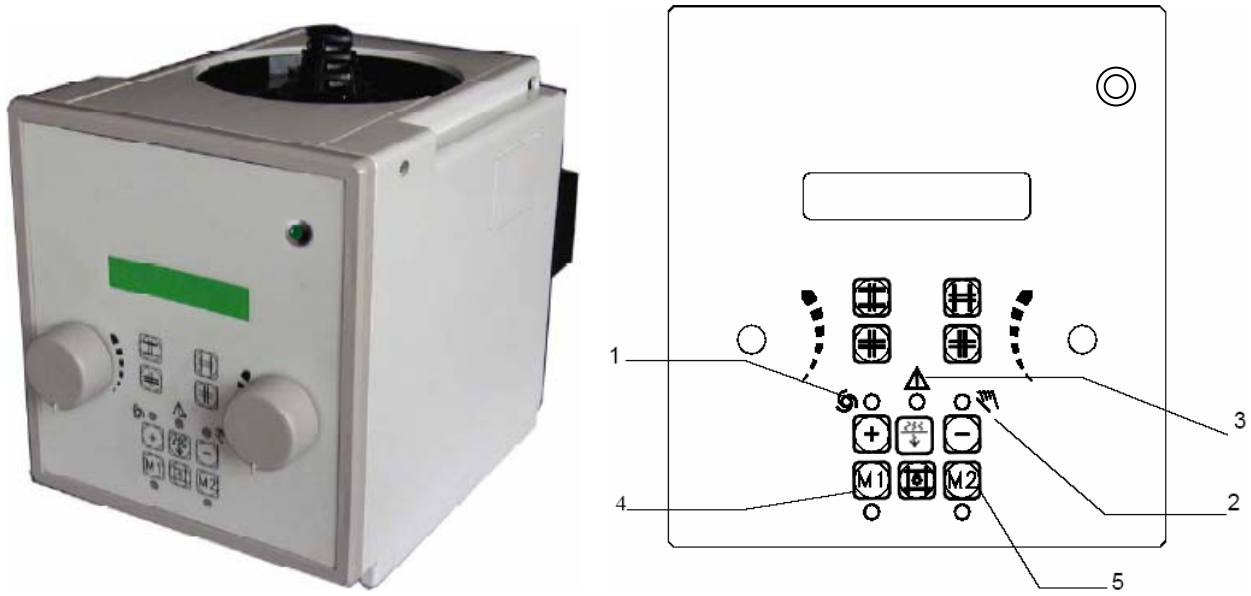
3.1.20.2. OTS automatic collimator

Also make reference to the following section 04 “Getting started” par. 4.8 “OTS, Table, WS and Manual / Automatic Collimator” and to the collimator specific manual.

Collimator description

This collimator is an automatic X-ray beam-limiting system with a multilayer square field collimator. A microprocessor circuit with step motor provides the stepless adjustment of the square field dimensions at variable Focal Distance (SID).



Two pushbuttons on the front panel permit the manual setting of the Focal Distance (SID). A key-switch on the rear cover of the collimator is provided to allow the user to override the automatic mode in case of a system failure. This key can only be removed when the automatic mode has been selected.

The direct visualization of the X-ray field is given by a light beam that corresponds to the X-ray beam within a tolerance of two percent of the selected distance. The light-field centre is indicated by the intersection of two perpendicular silk-screened lines into the Lexan window and projected on the light field by the light beam.

To activate the light field, press the area marked with the light symbol on the front of the device. The light will switch on for 30 seconds and then automatically switch off. Average illumination is not less than 160 LUX (FFD 100 cm); edge contrast ratio is minimum four to one.

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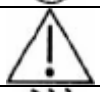
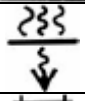
Symbols	Description
	Manual control
	Automatic control (closed loop)
	Attention, consult accompanying documents
	Radiation filter or filtration
	Light indicator of the radiation field
	Beam limiting device: open
	Beam limiting device: closed
	Beam limiting device with separate opening of the shutters
	Beam limiting device with separate closing of the shutters
M1	Memory 1
M2	Memory 2
	Manual setting Focal Distance in use

LEDs	Description
Green LED (1)	System Ready - Automatic Mode - X-rays are allowed
Yellow LED (2)	System in Manual Mode • Cassette is not inserted • Key switch is turned in Manual Mode • The collimator is not in a vertical (0°) or lateral left position • (– 90°), or lateral right (+90°) ± 10° tolerance. • Focal Distance (SID) – below the set value • Tomographic Mode set • The system receives no Focal Distance (SID) signal .
Red LED (3)	Shutters are moving - the system is NOT ready - X-rays are inhibited.
Green LEDs (4 / 5) M1/M2	Located near **M1** and **M2,** LEDs are ON if sizes have been memorized.

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DISPLAY:
The display guides the operator through the installation stages of the automatic collimation system. During operation, the display provides the operator with data regarding system status.

Display of the automatic Mode:
- Focal Distance (FFD- SID)
- Square field (Long and Cross).
- Value of additional filtration in the field.

Display of Manual Mode:
- Focus-to-table distance (DFT) if the X-ray tube is perpendicular to the table.
- If tube angulation exceed +/- 10°, the last Focal Distance setting can be adjusted manually with pushbuttons + and -
- Square field (long and cross) relating to the last manual Focal Distance and DFT set.

To obtain exact values, measure the Focal Distance and enter it in the system using the push-button controls.

Control push-buttons
- Two sets of push-buttons control the Long and Cross opening and closing features:
  - the closing control allows the reduction of the set format in both automatic and manual modes.
  - The opening control allows to re-open the format within the field set in the automatic mode and to open the field in the manual mode:
- One push-button for the light field lamp
- Two push-buttons to memorize two of the field formats more frequently used or formats that will be used during a subsequent investigation.
- Two push-buttons (+/-) to manually set the Focal Distance in use.
- One button to vary the value of additional filtration.

Knobs:
The two knobs serve for the movement of the long and cross shutters.
The set field may be reduced in the automatic mode.
The field size can be set manually.

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3.1.20.3. Operation indications

When the system is turned on it will switch to one of the following modes:

Red LED Exposure HOLD	The FFD (SID) in use is too short for the cassette in use; max. opening of shutters: 43x43 cm at 90 cm - i.e. the shutters are at end run but the motors are still running to attain a correct position. Increase the FFD (SID). Motors are moving to reach their correct position.
Green LED READY	The system is ready. All pre-set functions are allowed.
Yellow LED MANUAL	Cassette is not inserted Cassette tray not inserted correctly The system has no FFD (SID) Signal FFD (SID) – below the minimum set value. Collimator inclination exceeds 10° and is less than 80° Key switch (back of collimator) is turned to the Manual Mode. Tomographic Mode inserted Manual Mode selected
Insert a cassette:	The collimator will automatically adjust the field to the size of the cassette inserted.
Readings (Cassette sizes, FFD SID):	The collimator will automatically read FFD and cassette size inserted. The pushbuttons on the front reduce field size. Note: shutters cannot be opened to a field larger than that of the cassette size inserted. If the system is in the manual mode, the display will show the focus-to-tabletop distance; field size will be relative to this reading.

Prior to operating the collimator, check the settings related to correct x-ray beam functions.

RADIOGRAPHY

Automatic operation of square field (Long and Cross)
Collimator in the vertical position:

- The collimator must be vertical, ± 10°
- The cassette sensing Microswitch must be closed.

NOTE:
The cassette-sensing micro switch is excluded in flat analogic, flat digital and can settings.

- The Bucky supplies cassette size information.
- FFD (SID) is controlled by one or two potentiometers: one on the table, the other on the tube stand.
- The collimator automatically sets the cassette size according to the FFD (SID).
- The display indicates the FFD selected, type of filter selected, long and Cross opening.
- The green LED on the front panel serves to indicate that the unit is ready.

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The operator can:

- Turn the field light ON by activating the related pushbutton or via the external control
- Reduce the set field using the knobs or pushbuttons related to shutter opening on the collimator or the external controls. The field may be re-sized but always within the automatically set field size. If the shutters close completely, the output contact signalling "shutter closed" will be activated.
- Vary additional filtration by selecting the filters on the collimator control or external control. The collimator control provides a sequenced selection. The external control provides direct selection of filters.
- Vary FFD selected keeping the field size automatically constant.
- Memorise one or two formats using the two pushbuttons M1 and M2 on the collimator on externally. The selection is performed by depressing the pushbutton for about 2 seconds and confirmed by the LED on the collimator and the activation of the output contact. The collimator ignores possible cassette size changes and maintains the sizes memorised. The format is maintained at FFD variation. The command is de-activated by depressing the same pushbutton. Functions M1 and M" are identical.

Collimator in the lateral position:

- The collimator must be positioned –90° left, +90° right; ± 10°
- The cassette-sensing Microswitch must be closed.
- The Bucky supplies cassette size information.
- One of the 5 FFD (SID) lateral switch contacts must be closed.
- The collimator automatically sets the cassette size according to the FFD (SID) – field dimensions may be reduced manually.

The operator can:

- Turn the light field light ON by activating the related pushbutton or via the external control
- Vary the set field size.
- Vary FFD in use (selecting one of the 5 fixed FFDs) and keep the set field size automatically constant.
- Memorise one or two formats using the two pushbuttons M1 and M2 on the collimator or externally. Selection is performed by depressing the pushbutton for about 2 seconds and confirmed by the LED on the collimator and activation of the output contact. The collimator ignores possible cassette-size changes and holds the sizes memorised. The format is maintained at FFD variation. The command is de-activated by depressing the same pushbutton. Functions M1 and M2 are identical.

MANUAL OPERATION

The collimator is in the manual mode if:

- The collimator is inclined at an angle exceeding 10° and less than 80°.
- Manual control is selected.
- The cassette-sensing switch is open.
- The Bucky provides no information regarding cassette format.
- No FFD (SID) signal is present.

When the system is in the Manual Mode, the yellow LED on the front panel is lit and the output contact is activated.
The x-ray contact is always closed.

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The operator can

- Turn the light field ON by pressing the related button on the front panel.
- Reduce field directly with the knobs or pushbuttons related to shutter opening. Check on opening with the light field or display reading.
- Increase the set field with the knobs or the shutter-related knobs or pushbuttons (the field may be opened to the maximum setting fixed during the installation of the system). Check the opening with the light field or display reading.
- Vary the setting of the FFD in use using pushbuttons + and – on the front panel.

Manual Mode – key set.

The system is set to the Manual mode if the key switch on the rear of the collimator is turned to OFF: This setting excludes the electronics.
When the system is in the Manual Mode, the yellow LED on the front panel is lit and the output contact is activated.
The x-ray contact is always closed.

The operator can:

- Turn the light field ON by pressing the related button on the front panel.
- Reduce the set field size directly with the pushbuttons. Check on opening with the light field.
- Vary the setting of the FFD in use.

EXPOSURE HOLD MODE.

The systems sets to EXPOSURE HOLD

- in cases of incorrect operation conditions.
- When the system is in the automatic mode and the shutter motors are operating to reach the selected position.
- If the system fails to reach the selected position.
- The LED is lit and the output contact is activated.
- The exposure contact is open.

Inclinometer HOLD mode

- The control to exclude the inclinometer de-activates the signals from the device for angulation detection. Consequently, the system could remain in the automatic mode even though it might not be in a vertical position. This forces the collimator to operate in a vertical position.
- The deactivation of this control causes the system to calculate the signal from the angulation device on the PCB located within the collimator.

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Light field operation.

WARNING:
Prolonged lighting without allowing the lamp to cool causes the collimator to Overheat in the area near the lamp – for emergencies: maximum limit advised is 5 successive lamp operations. Allow the collimator to cool (about 10 min.). The operator must avoid overheating the collimator and care must be taken not to scorch himself or the patient

The collimator is normally operated by activating the pushbutton on the front panel to switch the light field ON.
The collimator has been designed to operate as follows:

- Supply constantly connected during operation of the equipment.
- Lamp ON time: ON time is pre-set in factory to 30s (tol.20%).
- A normal lamp ON / OFF cycle is established at 2 sequences followed by 4 minutes to allow for cooling (i.e. 1 minute ON / 4 minutes OFF)
- The field is set automatically by external electronics. For field reduction use the motor control pushbuttons on the front panel and check the dimension on the display or using the light field.
- Exposure is driven by the electronics that control the collimator.

3.2. Equipment data and characteristics

All the equipment of any X-ray installation must be connected to the electrical mains by means of a contact or another multi-polar sectioning device that has to be installed by the Customer. The room of the installation must be in compliance with the IEC/CEI or UL/CSA prescriptions in force.
The national regulations applying to X-ray installations must be carried out in all the relevant countries. The compliance with the above-mentioned Standards is strongly recommended where these are not contradictory compared with the national regulations established in order to ensure safety for the operator, the patient and third parties.
The sectioning device must be placed inside the exam room, just next to the operator.

Rated voltage	230VAC

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3.2.1. Positioner Electrical supply

Voltage change:	220/240Vac
Allowed mains fluctuations:	±10%
Mains frequency:	50/60Hz
Current absorption:	15A
Thermal dissipation:	500 W
Protection type:	Class I
Degree of protection:	Type B
Electromagnetic compatibility:	Complying with EN60601-1-2

Important Note:
Normally the power supply of the remote-controlled table is taken by a 16A, delayed 400VAC nominal, placed in the mains supply panel board of the exam room, with intervention differential current not higher than 30mA in compliance with IEC/CEI Standards.
In case the electrical distribution panel isn't preset with an ON/OFF switch, the switch must be accessible to the operator, to make him able to switch ON/OFF the table
In compliance with UL/CSA the equipment must be supplied by two delayed fuse of 16A – 400Vac with an ON/OFF switch placed in the mains supply panel board of the exam room,
The earth terminal of the equipment must be connected in a visible manner to the earth equipotential node of the diagnostic system by means of a protection conductor, with the minim section of 10mm^2.
The supply cable from the mains supply panel board to the equipment electrical cabinet must have a minim section of 2.5mm^2
All the conductors must be made in copper. All the supply connections and earth cables must be in compliance with the national rules or equivalent.

3.2.1.1. Environmental characteristics

OPERATING	
Ambient temperature range:	10 to 40 °C.
Relative humidity:	30% to 75% no condensation
Atmospheric pressure range:	700 to 1060 hPa

TRANSPORT AND STORAGE	
Ambient temperature range:	-20 to 70 °C.
Relative humidity:	10% to 90% no condensation
Atmospheric pressure range:	700 to 1060 hPa

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3.2.1.2. Positioner weights

	Elevating	Not Elev.
Weight of the equipment	790 kg	660 kg
Weight of the accessories	80 kg	80 kg
Patient's weight	182 kg	182 kg
Weight of the base plate	100 kg	114 kg
Support surface	1,10 m^2	1,00 m^2
Floor minimum bearing	1047 kg/ m^2	1036 kg/ m^2
Control panel (1)	90÷100 kg	
Control panel support base	≈ 0,2 m^2	
Power cabinet (2)	140÷170 kg	
Power cabinet support base	0,2 m^2	

3.2.2. Generator

Main features:

- Models available in maximum output power of 65 and 80 kW, in both radiographic and fluoroscopic models.
- Constant dose output due to kV and mA regulation during exposures.
- User-friendly controls.
- Large LCD panel display for APR and utility routines.
- APR techniques may be modified by the operator.
- ms and mAs limits for AEC may be operator set.
- Provisions for APR / tube downloading.
- Extensive self-diagnostics with operator prompt messages.
- Serial RS232 communications interface.
- May be programmed for APR operation only or both APR and manual technique selection.
- Time and mA / mAs selections are to IEC standards.

3.2.2.1. Generator Environmental specifications

See Generator Manual 5121728-100; Preparing for Installation, section 1C and Introduction, section 1A.

Rated voltage:	400 VAC 3 phases or 480 VAC 3 phases
Allowed mains fluctuations:	±10%
Mains frequency:	50/60Hz
Current absorption: 65kW, 80 kW	125 / 155 Amps/phase at 400 VAC 105 / 130 Amps/phase at 480 VAC
Standby current:	5 Amps

(1) The weight of the control panel is given by the weight of the control panel itself plus the weight of the support base in the simple T version.
(2) The weight of the power cabinet is referred to the complete version.

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OPERATING	
Ambient temperature range:	10 to 40 °C.
Relative humidity:	30 to 75% no condensation
Atmospheric pressure range:	500 to 1060 hPa (375 to 795 mm Hg).

TRANSPORT AND STORAGE	
Ambient temperature range:	-20 to 70 °C.
Relative humidity:	10 to 95%, including condensation.
Atmospheric pressure range:	500 to 1060 hPa (375 to 795 mm Hg).

3.2.2.2. Generator weight

The weight of the generator cabinet and of the available consoles is listed below:

Generator cabinet	235 lbs (107 kg).
Control console (Touch screen)	10 lbs (4.5 kg).

3.2.3. Digital system environmental specifications

Rated voltage:	90-132 VAC
Current absorption:	8 A
Allowed mains fluctuations:	±10%
Mains frequency:	50/60Hz ±0.5 Hz
Neutral to ground potential:	2 V p-p or less

OPERATING	
Ambient temperature range:	18 to 30 °C.
Relative humidity:	20 to 80%, no condensation
Atmospheric pressure range:	0 to 3000 m (≈ 650 to 1020 hPa)

TRANSPORT AND STORAGE	
Ambient temperature range:	-40 to 60 °C.
Relative humidity:	10 to 80%, no condensation.
Atmospheric pressure range:	0 to 12000 m (≈ 190 to 1020 hPa)

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3.2.4. Ceiling suspension

Rated voltage:	230 (220/240) Vac
Mains frequency:	50/60Hz ±0.5 Hz
Current absorption:	1,5 A
Max absorbed power:	350 VA (lamp of diaphragm 150 W included)

OPERATING	
Ambient temperature range:	10 to 40 °C.
Relative humidity:	30% to 75% no condensation
Atmospheric pressure range:	700 hPa to 1100 hPa

TRANSPORT AND STORAGE	
Ambient temperature range:	0 to 50 °C.
Relative humidity:	10% to 90%, no condensation.
Atmospheric pressure range:	500 hPa to 1100 hPa

3.2.4.1. Ceiling suspension collimator

OPERATING	
Ambient temperature range:	10 to 40 °C.
Relative humidity:	30% to 75% no condensation
Atmospheric pressure range:	700 hPa to 1100 hPa

TRANSPORT AND STORAGE	
Ambient temperature range:	-40 to 70 °C.
Relative humidity:	10% to 95%
Atmospheric pressure range:	500 hPa to 1060 hPa

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3.2.5. Wallstand

Rated voltage:	230 VAC +6 -10%
Mains frequency:	50 / 60 Hz
Current absorption:	0,16 A (0,5A transient)

OPERATING	
Ambient temperature range:	10 to 40 °C.
Relative humidity:	30% to 75% no condensation
Atmospheric pressure range:	700 hPa to 1060 hPa

TRANSPORT AND STORAGE	
Ambient temperature range:	-15 to 70 °C.
Relative humidity:	10% to 95% no condensation
Atmospheric pressure range:	500 hPa to 1060 hPa

3.2.6. Monitor

Rated voltage:	100 ÷ 240 VAC
Mains frequency:	50 / 60 Hz
Current absorption:	1.5 / 0.75 A rms
Normal operation power consumption:	55 W

OPERATING	
Ambient temperature range:	10 to 40 °C.
Relative humidity:	30% to 75% no condensation
Atmospheric pressure range:	500 hPa to 1060 hPa

TRANSPORT AND STORAGE	
Ambient temperature range:	-10 to 60 °C.
Relative humidity:	10% to 95% no condensation
Atmospheric pressure range:	500 hPa to 1060 hPa

Monitor weight	approx. 6.2 kg
Monitor dimensions	415 x 340 x 83 mm (W x H x D)

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4. Getting Started

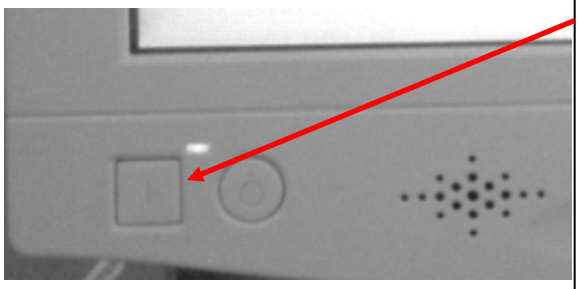
4.1. Switching on the system

NOTE:
DO NOT use the generator during the power-up cycle.

1 Turn ON the power for the positioner.
2 Turn ON the power for the x-ray generator.
3 Turn ON the power for each of the system's Image Monitors and other peripherals.
4 Turn ON the power for the system PC (switch is on the front panel). The PC will begin to run its power-up self-testing routine.
5 Once the system has completed the Login sequence, the ***Main Image*** screen will be displayed.

4.1.1. Switching on the generator

The X-ray generator on / off switches are located near the bottom left corner of the touch screen console.



Press I to switch the X-ray generator on. The LED adjacent to the generator on / off switches will light when the generator is switched on.

The touch screen console will power up when the generator is switched on. When the console has completed its startup routine, the main console menu will appear on the touch screen console.

Three menu selections are available; these are described next.

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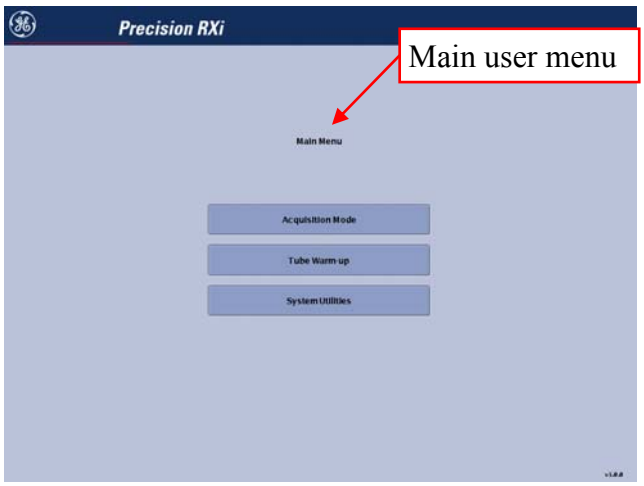

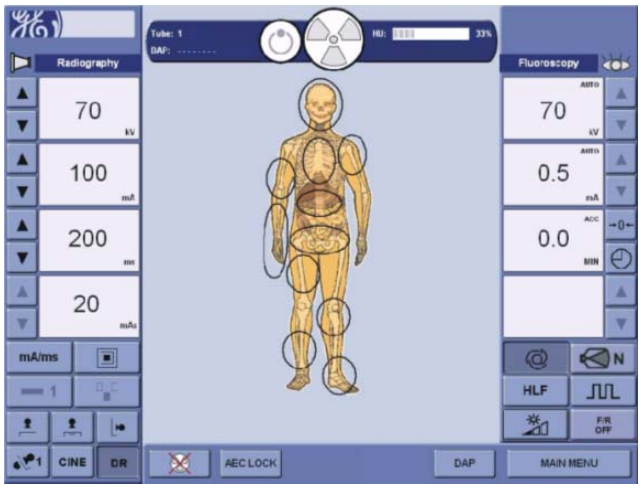

4.1.2. Switching on the positioner

A large red push-button is placed on the left upper corner of the console to set the equipment ON and OFF **(18)**.
Pull the push-button out to get the table's circuits power-supplied; press it to de-energize all the power circuits and reset the microprocessor's circuits.
The symbol placed below this push-button is to remind the operator before using the equipment that it is necessary to be informed about its performances.

4.1.2.1. Equipment startup procedure

At the equipment switch on or at the room safety/emergency push buttons activation (red push button pulled up) the equipment makes the table initialization. During this procedure the spot film device, the Image intensifier and the focal device will execute some automatic movements before allowing the equipment uses.
In case of a system with elevating tabletop and a 16" (40cm) image intensifier if the table is at an elevation quote under of 60 mm, the initialization procedure will be interrupted in order to avoid the collision of the image intensifier with the floor.

This interruption is signalled by the control console with the blinking of the elevating/tilting angle table height display and as a result the equipment will reduce its functionality (the spot film device exams are not allowed).

When this condition is present, to obtain the full equipment functionality, the operator have to move the table to an elevation quote further than 60 mm in order to obtain the initialization procedure completion.
We suggest to leave the equipment already in the right position (elevation further than 60mm) before switching off the equipment, in this way you will have the complete table initialization without interruptions.

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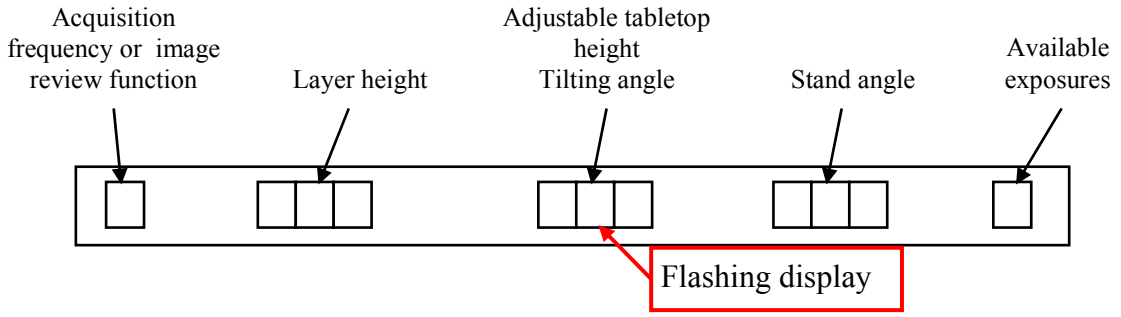
This "waiting" condition is signalized by the console display flashing (Adjustable tabletop height Tilting angle)

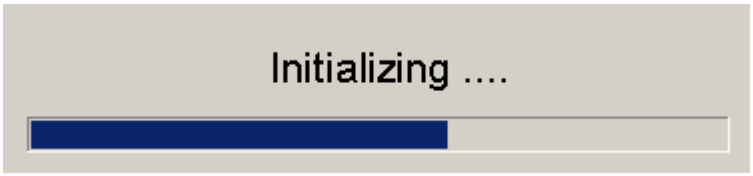


To enable complete system functionality the table should be moved above 60 mm to allow the initialization procedure to complete.

4.1.3. Switching on the digital system

- Turn ON the power for the system PC (switch is on the front panel). The PC will begin to run its power-up self-testing routine.
- Turn ON the power for each of the system's image monitors and other peripherals if required
- If auto-login does not occur and the login screen appears, type "operator" in the user field and press "Enter" (no password needed) to complete the log-in procedure.
- Once the system has completed the Login sequence, the Main Image screen will be displayed.

While the system is running the power-up self-testing routine, a screen indicating that the system is initializing may appear. This screen will disappear once the Main Image screen is displayed.



***NOTE**:*
The exact buttons shown on the screen can vary for configurations

***NOTE**:*
To ensure proper system operation, the manufacturer recommends that the Precision RXI system be restarted every day

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4.2. Switching off the system

4.2.1. Close the Precision RXi program

Normal Daily Operation / System Maintenance:

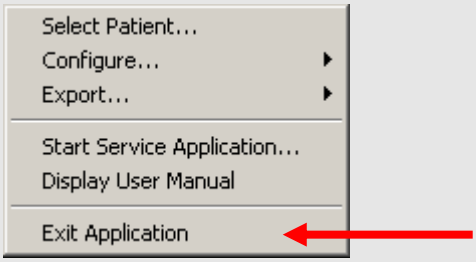
- The application needs to be closed daily (see instructions that follow);
- The PC should be powered down daily (refer to instructions in Paragraph 4.2.2).

For normal daily operation, only the Monitors need to be turned OFF to prevent image burn in.

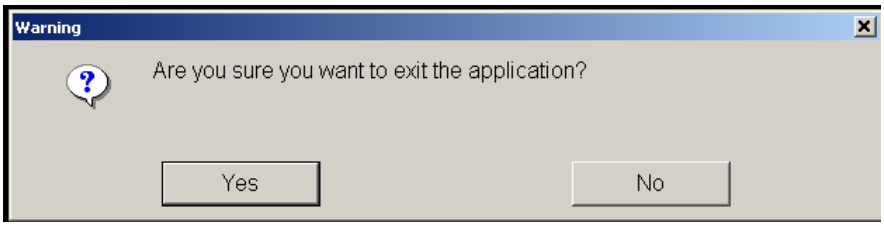
1 Close all patient files (instructions are given in Section 05 – Digital System Preliminary Functions).

2 Select the **Close** button

NOTE:
An alternate method is to position the cursor over the image portion of the screen, and right-click the mouse button. A sub-menu will appear. Select "Exit Application".



3 A confirmation request window will appear. Select **YES**.



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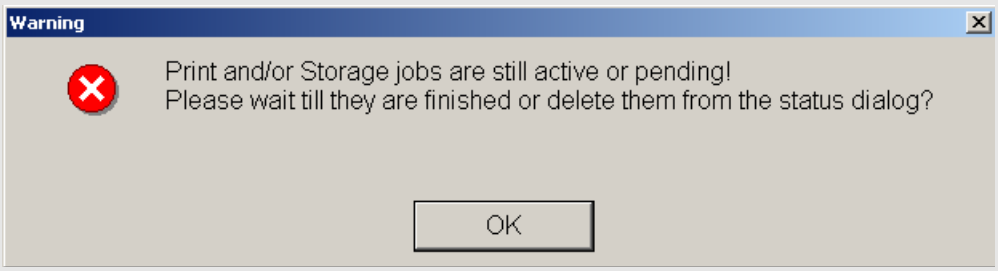
***NOTE**:*
The clinical application cannot be closed if there are pending DICOM jobs.
If an attempt is made to exit the program, a warning will be displayed indicating that the program cannot be closed until the DICOM and / or print jobs have processed through or are deleted.


Warning
Print and/or Storage jobs are still active or pending!
Please wait till they are finished or delete them from the status dialog?
OK

4 The *Precision RXi* system will safely and automatically close the *Clinical Application* software program. The computer is still considered to be ON.

4.2.2. Switching off the digital system

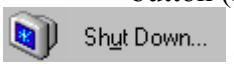
NOTE:
To ensure proper system operation, GE recommends that the Precision RXi system be restarted every day.

CAUTION:
DO NOT attempt to power down the system while images are being acquired.

CAUTION:
DO NOT attempt to power down the system while images are being sent to a DICOM device or CD/DVD device.

CAUTION:
DO NOT simply press the power button on the system PC. System errors may occur if PC is simply turned off at the power button without following the proper shutdown procedures outlined below

- Close the imaging system's program. If necessary, follow the instructions in par 4.2.1 to close the program, and then return to these instructions.
- Select the

button (lower left corner of screen). A submenu opens.
- Select the 

option. A new screen appears.

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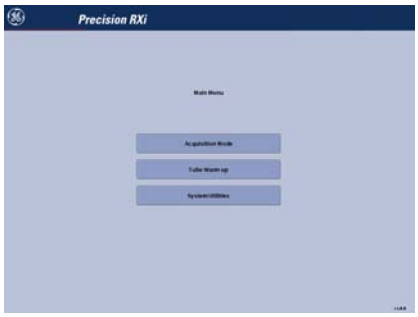
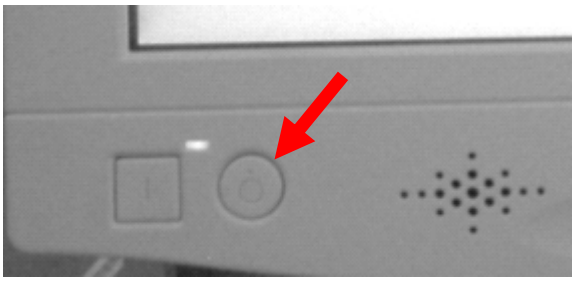
- Select "**Shut down**" from the pull-down list of options.
- Select the **OK** button from this screen.
- The PC will automatically power down.

***CAUTION**:*
If the Power Off function described above does not result in the PC being Powered OFF, contact your Site's Network Administrator or your Service Agency for assistance.
DO NOT simply press the Power button on the PC!

4.2.3. Switching off the generator

Exit the current screen(s) to return to the main console menu. Press to switch the X-ray generator OFF. The touch screen will power off immediately





4.2.4. Switching off the positioner

Use the large red push-button placed on the right upper corner of the console to de-energize all the power circuits and reset the microprocessor's circuits.

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4.3. Daily X-ray tube warm up procedure

The X-ray tube should be warmed up when the generator is first turned on for the day, or when it has not been used for several hours. This will reduce the possibility of damaging the X-ray tube.

CAUTION:
The following procedure produces X-rays. Observe all safety precautions to protect personnel.

Use this procedure when the generator is first turned on for the day, or when it has not been used for several hours. This procedure provides for exposures at medium power before the tube is used at maximum mA or kV values. This will reduce stress on the X-ray tube. No test setup is required.

1 Choose the tube to be warmed-up by selecting an image receptor that is programmed to select the desired tube.
2 Close the collimator blades.
3 Select the following:
- 80 kV.
- Large focal spot.

4 For a 200 to 300 kHU tube use approximately 160 mAs per exposure. For a 300 to 400 kHU tube use approximately 200 mAs per exposure. Depending on the X-ray tube power rating, select either 100 mA or 200 mA.
5 Make one (1) to three (3) exposures (depending on tube loading) at 30 second intervals.

NOTE:
A semi - automatic x-ray tube warm-up procedure is available on the touch screen console.

1 From the main console menu, press TUBE WARMUP.
2 Close the collimator blades.
3 Choose the tube to be warmed-up by selecting an image receptor that is programmed to select the desired tube.
4 Make the first exposure.
5 The console will time a 30 second interval, and then allow the next exposure.
6 Perform the second and third exposures when permitted.
7 Warm-up the second tube if desired by repeating steps 2 to 5.
8 Select MAIN MENU to return to the main console menu. The system is now ready for use.

ATTENTION:
The warm up procedure must be performed for the positioner X-ray tube and the ceiling suspension tube.

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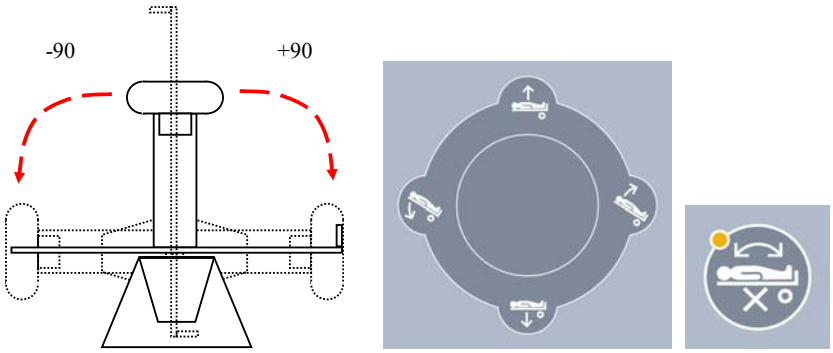
4.4. Positioner

4.4.1. Tilting movement

Table tilting is controlled by joystick **(63)**.
The speed of the tilting movement varies according to the degree of joystick inclination.
When the motion approaches the maximum travel, the tilting speed will automatically gradually decrease in order to avoid an abrupt stop. Even if the control is released suddenly the movement will stop smoothly.



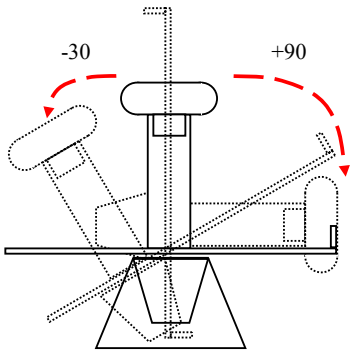
The push-button **(55)** deactivates the automatic stop of the table in the horizontal position; when the automatic stop is deactivated the LED will be lit. This button can be disabled in Service Mode if required.

When the patient tabletop is moved from the centre position towards the left or right side in a longitudinal way, and in addition when tabletop is driven to tilt position, the centring table control will be activated. The table tilting will start only after the tabletop has reached its central position.

If during the tilting tabletop movement from vertical position (±90°) to horizontal position (0°) with the focal device distance higher than 115cm (minimum focal device distance), the tabletop will have one inhibited movement due to the exam room size, the function focal device back movement will (SID) be activated and as a result, the focal device will go back to its minimum position (115cm).

4.4.1.1. Tilting movement – non-elevating table

The tilting with non-elevating version of the positioner is limited to -30° +90°.



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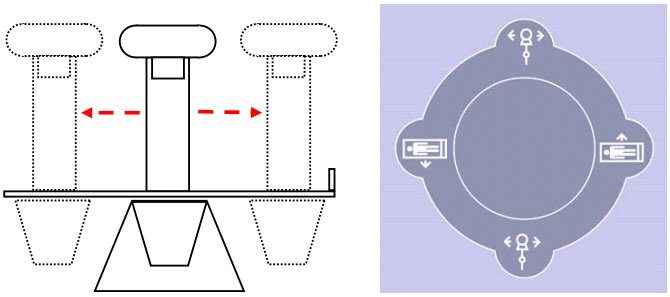
4.4.2. Tube Stand movement

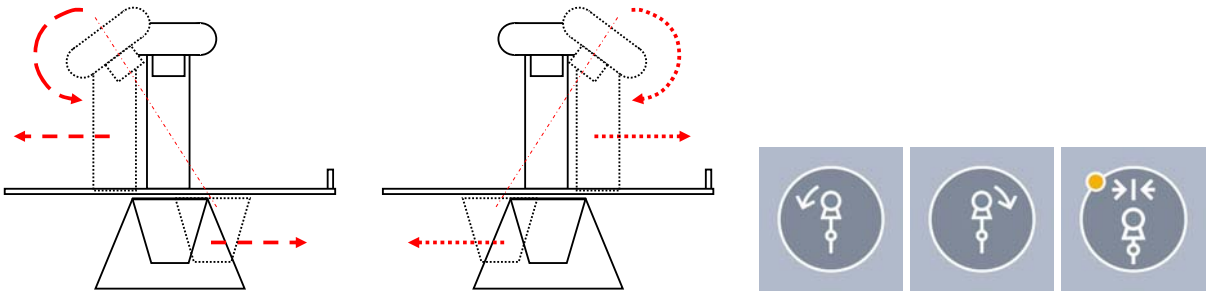
Joystick **(65)** controls the longitudinal and transversal patient scanning.
The movement speed varies according to the degree of joystick inclination.
The movements are such that anatomical correspondence is obtained with respect to the image on the monitor.



During longitudinal patient scanning (head feet and vice versa), if the spot film device and stand group has reached the end of stroke and you are still going on tipping the lever toward the same direction, the tabletop will start moving on the opposite side from the scanning movement.

4.4.3. Tube Stand inclination

The tube stand can be inclined up to an angle of +40° /- 40° using the push button **(64a** and **64b)**; the inclination angle is displayed both clockwise and counterclockwise.



Press the push-button **(56)** to restore the vertical position of the stand after the execution of oblique incidences; the LED will turn on as soon as the stand and spot film device group reach the vertical position.

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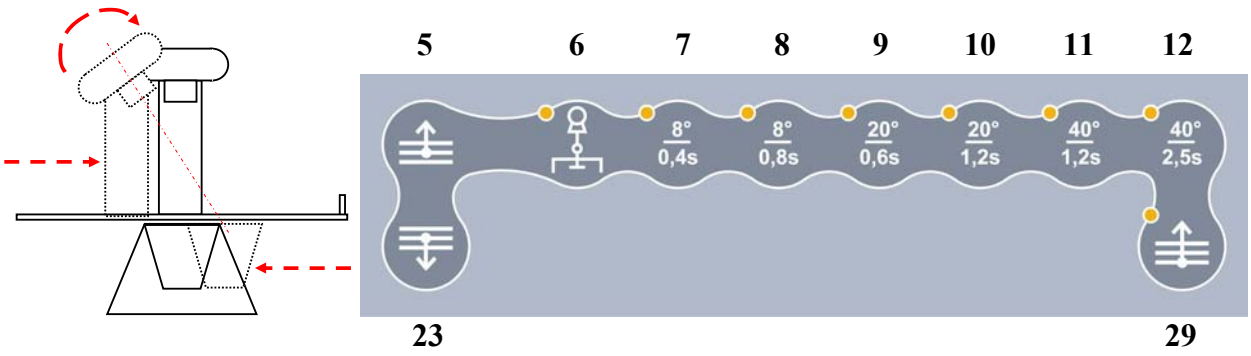
4.4.4. Linear Tomography

Tomography requires the movement of considerable masses that is contradictory to accurate movements. The RXi system takes a special advantage from the effort devoted to reduce the dynamic masses and the digital control ensures high accuracy and precision.

Features:

- Possibility of execution from -90° (or -18°) to +90°, with scanning in both direction;
- Tomographic area extended to the entire distance, enabled by the SFD;
- Angles: 8°, 18°, 40°;
- Two speed for each angle;
- Ability to change from tomography to radiography on the same cassette;
- Selection of the layer from 0 to 330 mm.



The tomographic functions can be activated by pressing one of these push-buttons **(7, 8, 9, 10, 11, 12)**. Each push-button allows the selection of the angle and scanning time. The LED will blink until the preparation condition is reached.

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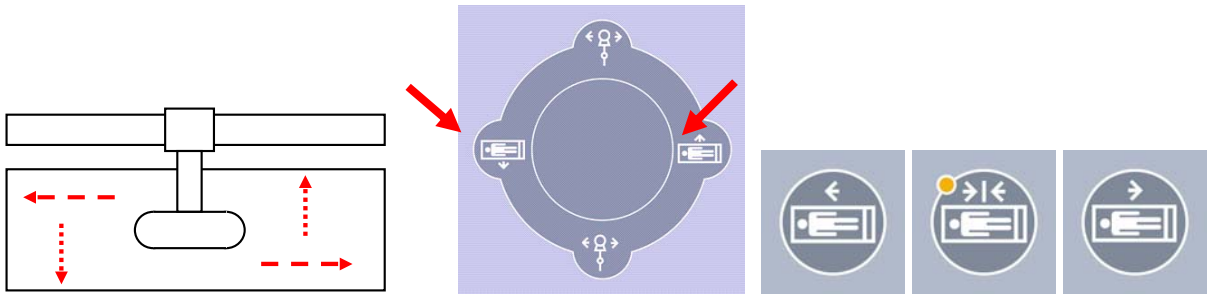
4.4.5. Patient tabletop movements



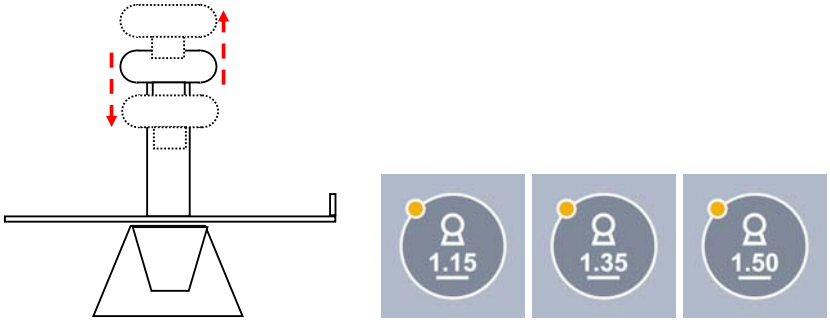
The controls of the longitudinal and transversal tabletop movements are activated by a joystick (**65**) and the push button (**57**) and (**59**).
The movement speed varies according to the inclination of the joystick. This enables the operator to change the scanning speed according to the operational needs.

The lateral push-buttons **(57 and 59)** control the tabletop longitudinal displacement. If the table tilting angle is 0° the tabletop head side travel length will be 86 centimeters; if the tilting angle is different from 0° the tabletop head side travel length will be 47.5 centimeters. Furthermore the tabletop feet side travel length is 15 centimeters.

ATTENTION
In case the tabletop head side longitudinal displacement is greater than 47.5 cm and you try to move the table out from its horizontal position (tilt angle ≠ 0°), just before the tilting movement takes place, the tabletop head side longitudinal displacement will return at 47.5 cm. As soon as the tabletop completes this movement the table tilting movement will take place.

The center push-button **(58)** is used to place the tabletop in its original centered position.
As soon as the tabletop reaches the central position, the push button (58) LED will light up.

4.4.6. Focal equipment movement



These push-buttons **(36, 37, 38)** drive the system toward the focal distance indicated on each push-button. If the push-button is released before the exact distance indicated on the button is reached all three LED's will flash. If the exact distance indicated on the push-button is reached, the LED on that push-button will turn on.

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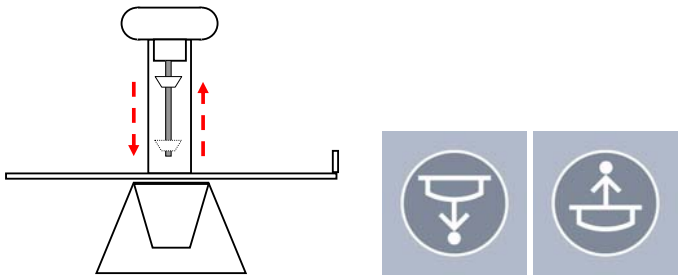
4.4.7. Compressor movement



Push-button (**62a)** lowers and activates the compressor, push-button (**62b**) raises and parks the compressor.
As soon as the compressor touches the patient layer the following movements will be inhibited: tabletop, stand and spot film, stand inclination or centering, focal distance decrease.

The activation of the tomography command will result in the compressor automatically raising and parking.

Compressor parking position

Compressor in use

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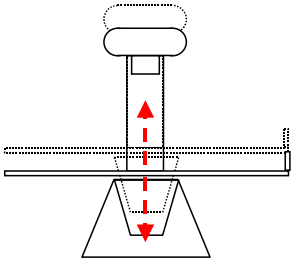
4.4.7.1. Manually setting the patient free from the compressor

Should the need occur to manually free the patient from the compressor, you shall make reference to the following procedure and figures:

1) You shall tightly take hold of the patient by seizing him under his armpits.
2) You shall pull the patient off the compressor

It is also possible to raise the compressor carriage by pushing firmly. The compressor carriage will move upwards as soon as you lift it with sufficient strength. The mechanical friction drive will prevent the equipment from being damaged.

4.4.8. Table elevation (optional)



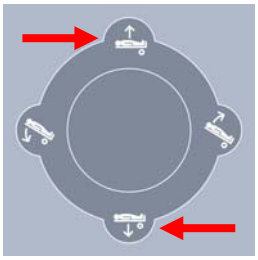


Table elevation is controlled by joystick **(63)**.
With the elevation option, tip the joystick up to elevate the table and down to lower the table.

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4.4.9. Cassette tray movement

Push-button **(60)** alternately controls the entrance of the cassette-holder in the SFD and its exit; the LED will turn on to signal the cassette-holder is exiting.

With an image intensifier of 16", by pushing the in/out cassette button, the table will move up to 60cm when it is positioned under that elevation quote. When the table is positioned under the image intensifier elevation quote (60mm), on the console display will appear the blinking signal with the quote value. By keeping pressed the out cassette push button automatically will start the table elevation movement until there is enough space for allowing the image intensifier descend and the cassette holding coming out.

4.4.9.1. Inserting the X-ray cassette in the table cassette-holder

Before opening the SFD cassette holder, you must have previously selected the SFD receptor (Spot Film Device) by pressing the related push-button on the control console or Touch Screen.

1) You shall press the push-button controlling the opening of the SFD cassette-holder: this push-button is placed on the console or next to the cassette-holder itself.
2) You can now insert the X-ray cassette by pushing the two external edges.

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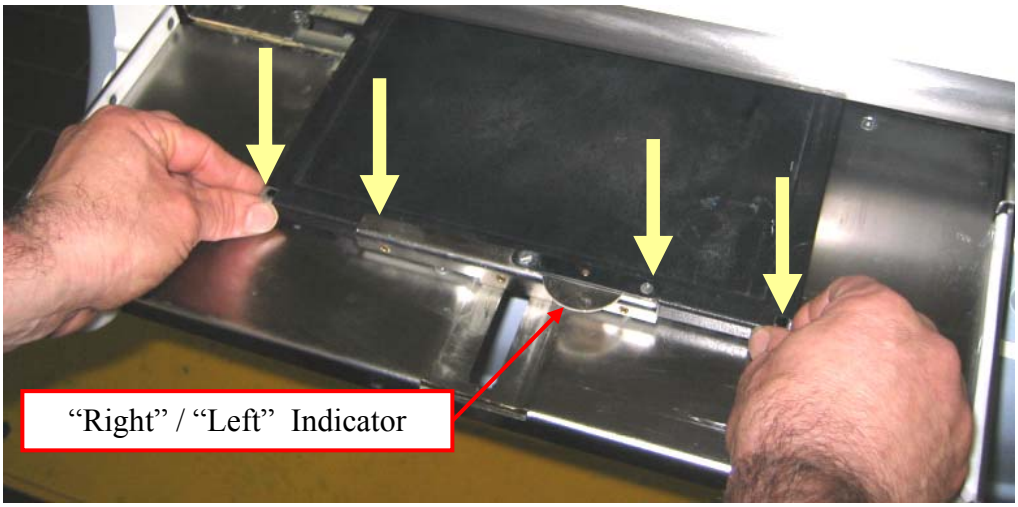
3) You shall therefore settle gently the cassette on the cassette-tray till the cassette itself goes beyond the external guide.

4) You shall now fit the X-ray cassette into the guide **paying attention to your fingers position.**

5) You shall adjust the "Right" and "Left" indicator if necessary.



ATTENTION:
In order to avoid ***crushing your fingers,*** *please make sure you carefully follow the procedure for inserting the X-ray cassette.*

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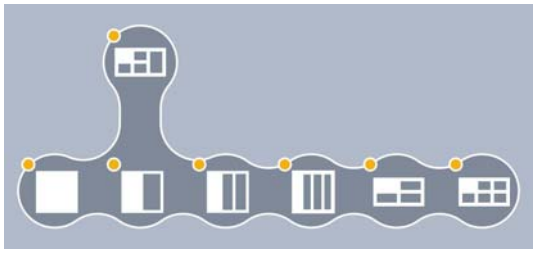
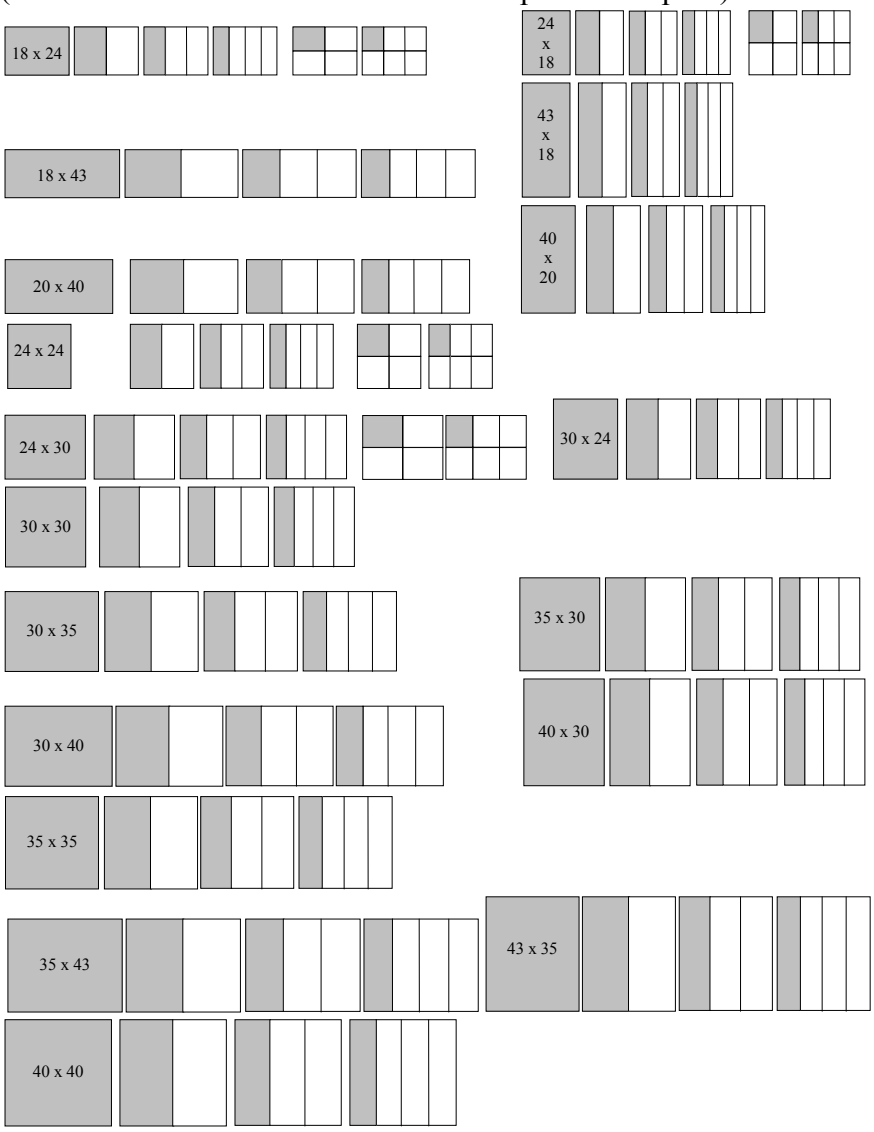
4.4.10. Cassette size division movement



Push-buttons **(31, 43, 44, 45, 46, 47 and 48)** allow the operator to program the division of the transversal size and crossed-size of the film.

(13 x 18 and 15 x 40 cm cassettes with optional adapter.)



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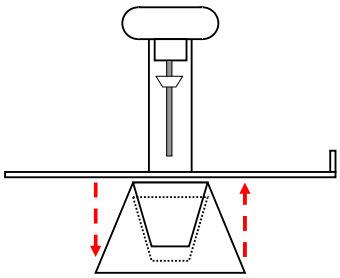
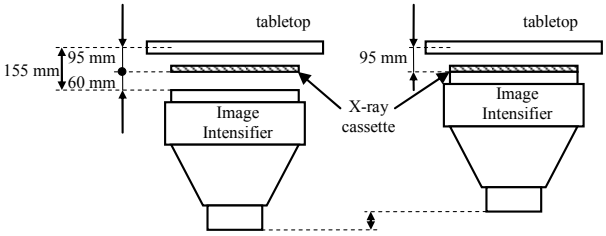
4.4.11. Image intensifier elevation

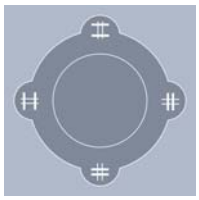




Push-button **(52)** gives to the operator the opportunity to choose if to make exams in fluoroscopy function with the I.I. placed at the minimum distance from the tabletop (normal condition – LED off) or the I.I. left at the same distance that it assumes when SFD cassette-holder is in field (efficiency condition - LED on).

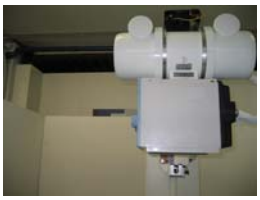
- The normal condition is the best possible condition for geometrical magnification and resolution.
- The efficiency condition minimizes the transition time from fluoroscopy to radiography.

4.4.12. Collimator movements

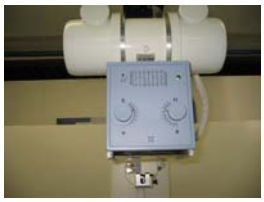


Using joystick **(61)** the internal collimator diaphragms can be opened and closed.
Tip the joystick up to open the longitudinal diaphragms and tip the joystick down to close them.
Push the joystick left to open the transversal diaphragms and push it right to close them

It is possible to rotate by hand the collimator to ±90.



Collimator rotated to left side



Centered collimator

Collimator rotated to the right side

It is possible to lock the collimator with a screw in the center position if local regulations do not permit collimator rotation.

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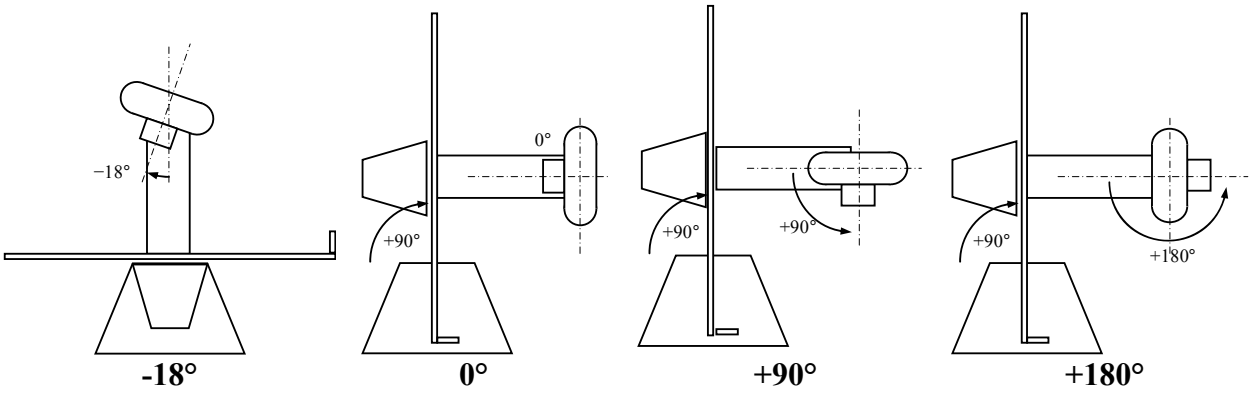
4.4.13. Iris movements

These push-buttons **(50 and 51)** control the iris diaphragm: the push-button on the left **(50)** opens the diaphragm, while the push-button on the right **(51)** closes it.

4.4.14. Manual tube rotation

It is possible to manually rotate the tube to ±18° / ±72° / ±90° / +180° position.



For some old positioner versions it is possible to manually rotate the tube to ±18° / +72° / +90° / +180° position only.

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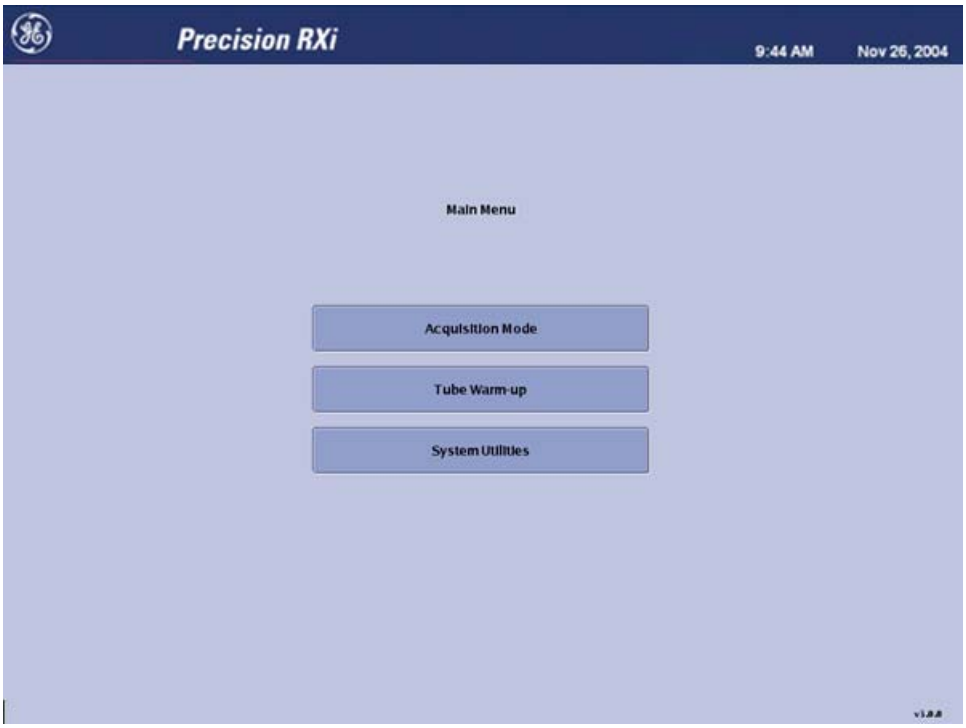
4.5. Generator Console display and operation

4.5.1. Main menu

The following selections appear on the touch screen console after the console is switched on, and when exiting out of acquisition mode, tube warm-up mode or system utilities mode.



- **Acquisition Mode**: Press to select the normal console-operating mode. After a brief delay, buttons and indicators will appear on the touch screen along with an anatomical graphic for APR selections.
- **Tube Warm-up**: Press to start the X-ray tube warm-up routine.
- **System Utilities**: Press to enter the utilities menu (APR editor and APR backup and restore).

The current date and time are displayed at the top of the main menu.

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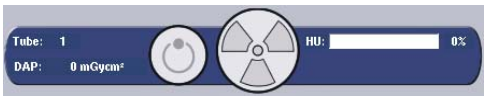
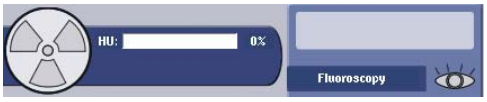
4.5.2. PREP / EXPOSE buttons and indicator

Press the exposure button halfway to the PREP position. This will spin the rotor. Fully depress and hold the exposure button in the EXPOSE position to make an X-ray exposure.

Fluoroscopic exposures are initiated by pressing and holding the fluoro foot switch.

	When the prep state is active, the prep indicator ○ on the touch screen display will change to green. When the prep cycle is complete, **Generator Ready …** will be displayed.
	During a radiographic X-ray exposure, the ▷ and ☢ symbols will change to yellow. This will be accompanied by a continuous tone from the console.
	During a fluoroscopic X-ray exposure, the 👁 and ☢ symbols will change to yellow. This will be accompanied by an intermittent tone from the console, or a tone at the beginning and end of the fluoro exposure, depending on programming.

NOTE:
The touch screen membrane can be easily scratched by sharp objects. To avoid possible damage, items such as pens, pointers, tools, etc should not be brought near the touch screen membrane.

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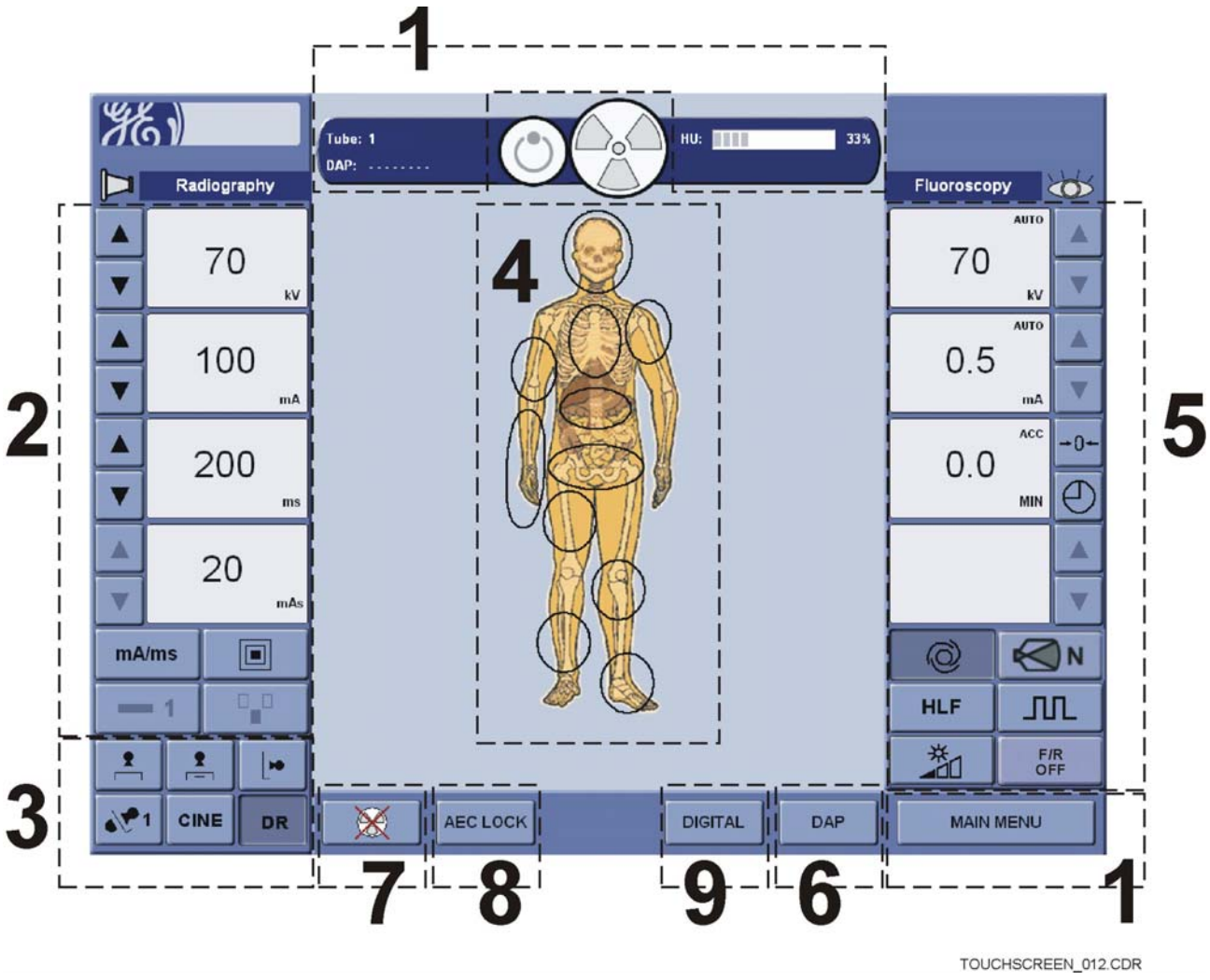
4.5.3. Consol Display and Operation

The main console menu is displayed when the console is switched on and when exiting out of manual/APR mode or system utilities mode.
To select the normal console-operating mode, press **Acquisition Mode** on the main menu screen.
After a brief delay, a screen similar to that shown below will display.



NOTE:
The above console display is typical. The display on your system may vary depending on programming and technique selections.

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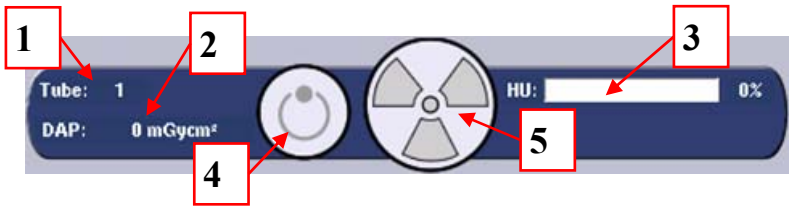
The functional blocks outlined on the previous page are described below. Each function within these blocks is discussed in detail in this section.

1 Tube 1/Tube 2 indicator, DAP display, anode heat indicator, and back / main menu selector button.
2 Radiography controls and display.
3 Image receptor selection buttons.
4 Anatomical programming selector.
5 Fluoroscopy controls and display.
6 DAP (Dose-Area Product) reset / test / print selection button.
7 X-Ray lock-out button.
8 AEC lock selection button.
9 Digital functions selection button. This opens a window on the touch screen that provides digital imaging system controls (not enabled / not used).

4.5.3.1. Tube 1/Tube 2 indicator, DAP display and anode heat indicator



Tube 1/Tube 2 indicator.

1 This will indicate which X-ray tube has been programmed for the selected receptor. On one-tube generators, the display will always be Tube 1.

DAP (Dose Area Product) or AK (Air Kerma) Display

2 This displays the cumulative DAP (dose-area product), or the DAP rate as described later in this section.
It is also possible to configure the system in order to use the AK (Air Kerma) calculation algorithm for dose measurement. This calculation algorithm can estimate the air kerma dose with a ±35% maximum error (at the minimum focal distance as per the FDA requirement 1020.32). This algorithm is alternative to the DAP device.

Anode heat unit indicator (HU).

3 Indicates the tube anode heat, as a percentage of the anode rating, for the selected X-ray tube. An anode heat warning message will be displayed at an installer-programmable level, typically 80 %. Exposures that will exceed a value of typically 90 % will be inhibited (this is also installer programmable).
4 Exposure preparation indicator.
5 X-Ray emission indicator.

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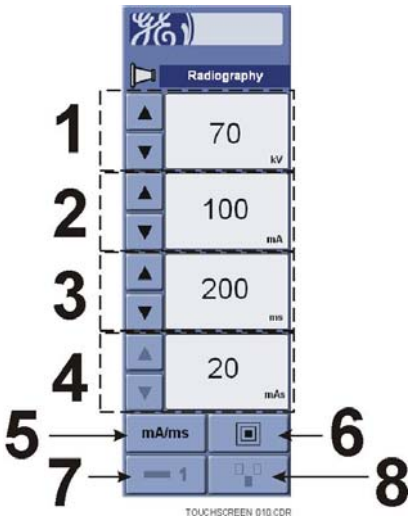
4.5.3.2. Back / main menu selector button.

Press to back out of anatomical views or regions when in APR mode, or to return to the main console menu when **MAIN MENU** is displayed.

4.5.3.3. Radiography controls and display



1 kV up / down buttons and display.
2 mA up / down buttons and display.
3 ms / mAs up / down buttons and display.
4 Density up / down buttons and display and mAs readout.
5 Technique select button (AEC, mAs, mA/ms).
6 Focal spot select button.
7 Film / screen select button.
8 AEC field select button.

kV up / down buttons and display

	To increase kV, press ▲ To decrease kV, press ▼ Displays demanded kV of the exposure.

mA up / down buttons and display

	To increase mA, press ▲ To decrease mA, press ▼ The mA may be adjusted when AEC or mA/ms is selected. The preselected mA is displayed when mAs is selected. The mA is not adjustable in mAs mode.

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ms / mAs up / down buttons and display

	To increase ms or mAs, press ▲ To decrease ms or mAs, press ▼ Displays ms when mA/ms is selected. Displays mAs when mAs is selected. Displays **AEC**, or shows the AEC backup ms or mAs in AEC mode. Review the note below regarding AEC backup options. Displays post-mAs after an AEC exposure.

The AEC backup mode is installer programmable for each receptor. If **FIXED** AEC backup has been programmed for the selected receptor, the backup ms and mAs cannot be adjusted. If **ms** or **mAs** AEC backup has been selected, the AEC backup ms or mAs respectively is operator adjustable within preset limits by pressing the ▲ or ▼ buttons

Density up / down buttons and display and mAs readout

	To increase density, press ▲ To decrease density, press ▼ Displays density when AEC is selected. The density range is typically -5 to +5 (installer programmable to have a range of -8 to +8). This varies the optical density by varying the dose. Each density step will change the dose by approximately 10% (installer programmable). In mA/ms mode, displays the calculated mAs of the next exposure (based on the selected mA and ms).

Technique select button

	This function may be disabled in programming. Press the technique select button until the desired technique is selected. • **AEC** for Automatic Exposure Control (1 point technique). • **mAs** for mAs technique (2 point technique). • **mA/ms** for mA and ms technique (3 point technique).

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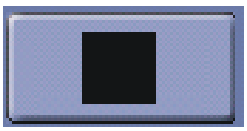
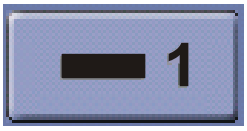
Focal spot select button

	Press the focus select button until the desired focal spot is selected. for small focus. for large focus. This function may be programmed for auto focal spot selection.

If the selected receptor is programmed for film, a film/screen select button will be displayed as per option A.
If the selected receptor is programmed for a digital recording device, an exposure level button will be displayed as per option B.

OPTION A: film / screen select button

	Press the film / screen select button to select the desired film / screen combination. 1 for film / screen 1. 2 for film / screen 2. 3 for film / screen 3. This function is available only when AEC is selected.

OPTION B: Exposure level select button

	Press the exposure level select button to select the desired exposure level. (for exposure level 1, level 2, level 3) This function is available only when AEC is selected.

AEC field select button

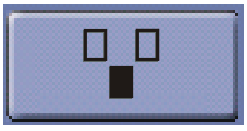
	Press the AEC field select button. A pop-up window will display showing the three AEC fields. Fields that are disabled in programming will be crossed out. Press the appropriate field symbol on the pop-up window to select / deselect individual AEC fields (all three fields may not be deselected). The selected field(s) will be shown in black on the AEC field-select button. Pressing any button will close the pop-up window. This function is available only when AEC is selected.

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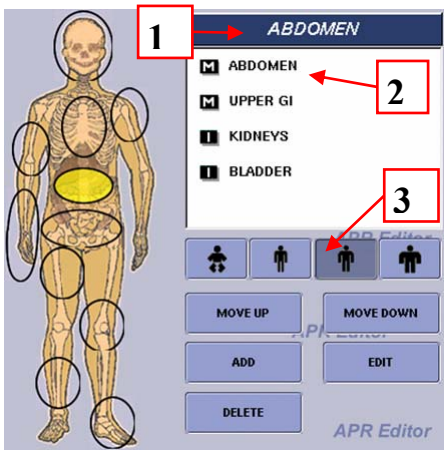
Image receptor buttons

	Press the appropriate image receptor button to select the desired image receptor. The figure at the left is intended to show the image receptor button layout only. The receptor symbols are typically customized for each installation. This may be done at the time of installation, or after installation as required.

4.5.3.4. Anatomical programming selector



1 Select the region of interest by pressing the appropriate area on the anatomical figure on the touch screen display (i.e. ABDOMEN). The selected area will change to yellow and a pop-up window will appear on the display.

- The caption on the pop-up window indicates the selected anatomical region (i.e. ABDOMEN).
- The pop-up window will display one or more menu, procedural, or APR items. A menu item will have an **M** beside the name, a procedural item will be identified with a **P** beside the name, and an APR item will have an **I** beside the name.
  * A **menu item** (i.e. ABDOMEN) has one or more submenus. The submenu(s) may include additional menu items, procedural items, and / or APR items.
  * A **procedural item** (i.e. FOOT) has one submenu. That submenu will contain only APR items.
  * An **APR item** (i.e. FOOT AP) has no submenus. Selecting the desired APR item will set predefined radiographic or fluoroscopic protocols in preparation for an exposure.

2 If the appropriate APR item (**I** beside the item name) is shown on the selected menu, select that item. The selection will be highlighted, predefined radiographic and / or fluoroscopic parameters and techniques will be set in preparation for an exposure, and the patient size will default to medium.

- To change the patient size, press the corresponding button.
  * = pediatric.
  * = small.
  * = medium.
  * = large.
- If the assigned parameters and techniques are appropriate, an X-ray exposure may be taken.
- The default settings may be changed, if desired, before making an exposure. Please review the sections RADIOGRAPHY CONTROLS AND DISPLAY and FLUOROSCOPY CONTROLS AND DISPLAY before making any changes. Changes made are not saved to memory. To make and then save APR changes, refer to section SYSTEM UTILITY – APR EDITOR

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NOTE:
The factory-default x-ray technique factors must be confirmed as being suitable for the application. These should be edited as required, with the updated technique factors saved as per chapter apr editor

3 If the appropriate procedural item (**P** beside the item) is shown on the selected menu, select that item. A submenu will appear showing one or more APR items within that procedure.
APR items within a procedural menu will be automatically selected in sequence. For example, assume that the procedural item FOOT contains the three APR items FOOT AP, FOOT LAT, and FOOT OBL.

- The first item on the list (i.e. FOOT AP) is automatically selected. The selection will be highlighted, and predefined parameters and techniques will be assigned for that study.
- An X-ray exposure may be made as per step 2.
- When the exposure is finished, the APR will advance to the next APR item (i.e. FOOT LAT). That selection will be highlighted, and predefined parameters and techniques will be assigned, readying the generator for that study.
- Another X-ray exposure may be made.
- If an exposure needs to be repeated (i.e. FOOT LAT), reselect that item, and repeat the exposure.
- The generator will advance to the last item (i.e. FOOT OBL). The last X-ray exposure may be made.

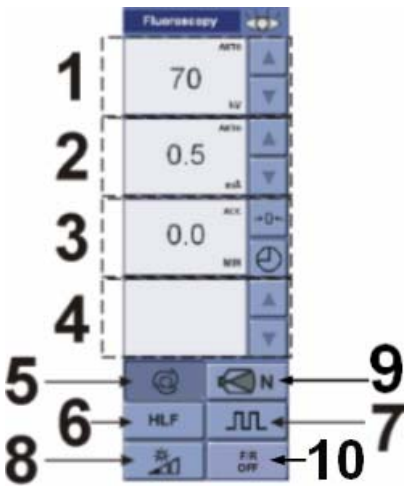
4 If the appropriate menu item, i.e. SKULL, (**M** beside the item) is shown on the selected menu, select that item. A submenu will appear showing one or more menu, procedural, or APR items within that category.

- Menu items may be nested. It may be necessary to drill down through several submenus to find the desired procedural or APR item.
- The appropriate procedural item or APR item may be selected as per the previous steps.
- Menu, procedural, and APR items may be programmed to suit your requirements. Refer to section 4.5.4 for details.

5 Press the **BACK** button to back out of the APR menu structure. A new region of interest may be selected at any time by pressing the appropriate area on the anatomical figure on the touch screen display as in step 1. It is not necessary to back out of an existing menu first.

4.5.3.5. Fluoroscopy controls and display

1 Fluoro kV up / down buttons and display.
2 Fluoro mA up / down buttons and display.
3 Time zero and accumulated time buttons and display.
4 Pulsed fluoro frame rate buttons and display.
5 ABS (Automatic Brightness Stabilization) select button.
6 HLF (High Level Fluoro) select button.
7 Pulsed fluoro select button.
8 ABS dose rate select button.
9 Image Intensifier magnification
10 Fluoro to rad transfer function



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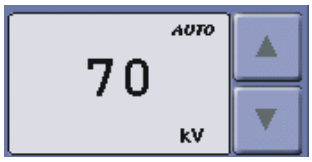
NOTE:
The fluoro kV and fluoro mA buttons are only functional when ABS is switched OFF.

Fluoro kV up / down buttons and display

	To increase kV, press ▲ To decrease kV, press ▼ ***AUTO*** indicates that ABS is selected, therefore manual kV control is not available.

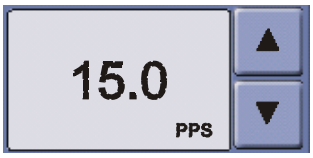
Fluoro mA up / down buttons and display

	To increase mA, press ▲ To decrease mA, press ▼ ***AUTO*** indicates that ABS with auto mA is selected, therefore manual mA control is not available.

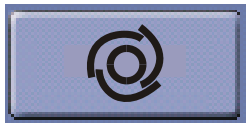
Time zero and accumulated time buttons and display

	Displays the running and cumulative time of a fluoroscopic exposure when the accumulated time button is not pressed. To reset the time display to zero, press -0-. To display accumulated fluoro exposure time, press . To reset the accumulated time, press -0- when the accumulated time is displayed.

Pulsed fluoro frame rate buttons and display

	Displays the pulsed fluoro frame rate. This is only active when pulsed fluoro is switched ON. To increase the PPS (Pulse Per Second) rate, press ▲ To decrease the PPS rate, press ▼

ABS (Automatic Brightness Stabilization) select button

	Press to select ABS. The fluoro kV will indicate ***AUTO***. The fluoro mA will also indicate ***AUTO*** if the ABS dose is set to auto kV and mA. Fluoro kV and fluoro mA cannot be set manually when auto kV or auto mA is indicated.

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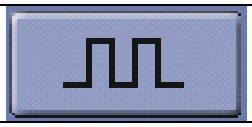
HLF (High Level Fluoro) select button

	This is only active for optional high level fluoro (HLF). The fluoro mA range is 0.5 to 10.0 mA if HLF is off, and 0.5 to 20 mA if HLF is on for continuous fluoro. For pulsed fluoro, the mA range is 5 to 40 mA if HLF is off, and 5 to 80 mA if HLF is on. The frequency (pitch) of the tone from the console will increase during an exposure when high level fluoro is selected.

Pulsed fluoro select button

	Press to select pulsed fluoro. This is only active for optional pulsed fluoro.

ABS dose rate select button

	Sets the ABS dose. When the ABS dose rate select button is pressed, a pop-up window as shown below will display with three dose selections. Select the desired dose by pressing the appropriate button on the pop-up window. Making the dose selection will close this window: • = Low Dose (auto kV and mA). • = Normal (auto kV and mA). • = High Contrast (auto kV and mA). This function is only active when ABS is on.

Image Intensifier magnification button

	Press to select the II magnification. The values allowed are N, 1, 2, 3 or N, 1 , 2, depending on the II dimensions.

Fluoro to rad transfer function

	Selects the fluoro to rad kV transfer function. • OFF: The fluoro to rad kV transfer function is disabled. • LOW (typically for radiography): select the first of three fluoro to rad kV transfer curves. • MEDIUM (typically for contrast): select the second of three fluoro to rad kV transfer curves. • HIGH (typically for G.I. studies): select the third of three fluoro to rad kV transfer curves.

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4.5.3.6. DAP (Dose-Area Product)

The DAP function is only available if the optional DAP device is installed in the X-ray system, and if the DAP function has been enabled in programming.
Any references made to tube 2 or the ability to switch tubes apply to two tube generators only.

DAP Overview

- The DAP device(s) must be allowed to stabilize when the generator is switched on, and the first time when switching from tube 1 to tube 2 or from tube 2 to tube 1.
  During this "settling" period, the DAP display will indicate "--------". X-ray exposures may be made during this time, but the DAP function will be disabled during the settling period. The settling period may last up to a few minutes after the generator is switched on.
- The DAP device for the tube that is selected when the generator is switched on is automatically tested by the generator after the settling period. If the DAP device passes the self-test, the DAP readout will display its last setting. This indicates that the DAP is functional, and ready to measure the dose-area product.
  If the DAP self-test fails, an error message will be presented, and the DAP readout will display "--------". This indicates that the DAP is not functional.
- When switching to the other tube for the first time in that session (from tube 1 to tube 2 or from tube 2 to tube 1), the DAP device associated with that tube will be tested. As in the previous step, the DAP readout will display its last setting to indicate that the DAP is functional, or "--------" to indicate that the DAP is not functional.

NOTE:
A reading of 0 mGycm^2 indicates that the DAP display has been manually reset as described later in this section, and that no exposures have been taken since it was reset.

NOTE:
Always check local regulations to determine how frequently the DAP device must be tested. The procedure to test the DAP follows later in this section.

DAP Display

- Before proceeding with initial dose-area product measurements, ensure that the DAP display is 0mGycm^2. The DAP display may be manually reset to zero as described in DAP Reset / Test, below.
- The DAP measures and displays cumulative dose per unit area when in RAD mode. It may be programmed to measure and display the dose-area product for each tube individually, or to sum the readings from both tubes. This is installer programmable.
- In fluoroscopy mode, the DAP may be programmed to display accumulated dose-area product (mGycm^2), or DAP rate (mGycm^2/s). If programmed to display DAP rate, the DAP rate display will be in reverse video during fluoroscopic operation. When the fluoro run is finished, the DAP display will revert to normal video, and the accumulated dose will be displayed. The DAP rate feature for fluoro operation is installer programmable.
- The maximum accumulated reading on the DAP display is 9999999. An error message will be presented when this limit is reached.

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DAP Reset / Test / Print

The DAP display(s) may be reset to zero, a manual DAP functional test may be performed when desired, and a label may be printed with the DAP and patient information as described below.

1 In order to select the DAP device to test, select a receptor that is programmed for the desired tube / DAP device (tube 1 or tube 2). This will also select the DAP to reset if programmed for ***individual*** dose-area product readings for each tube.

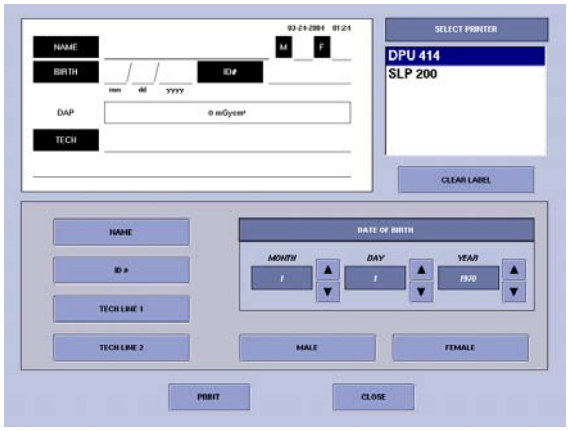
- If the two DAP readings are **summed**, the reset function may be performed on either the tube 1 or tube 2 selection. The DAP display is common to both tubes, therefore the DAP display may be reset at either the tube 1 or tube 2 tube position.
- If the generator is programmed for **individual** DAP measurements for each tube, and you are intending to reset the DAP display, confirm that the correct tube / DAP device is selected before continuing.

2 Press the DAP button at the bottom of the touch screen display. This will present the DAP reset / test / print menu.

- Press **RESET** to reset the DAP display to zero. The display will reset, and the reset / test / print menu will close.
- Press **TEST** to test the DAP. The message DAP Test [PASSED] will be displayed if the DAP has passed its test. Press **OK** to close the test status window.
- REPEAT THE TEST OR RESET FUNCTION FOR THE OTHER TUBE IF DESIRED.
- Press **PRINT** to open the DAP printer interface window. The DAP printer function is described in detail on the next page.
- Making a selection from the reset / test / print window will automatically close the window.

DAP Printer Interface Window

The DAP printer interface window is accessed via the **PRINT** button on the DAP reset / test / print menu, as described on the previous page. This allows a label to be printed with the currently displayed DAP value, and with patient information that must be entered manually.



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From the printer interface window, enter the following information:

- Enter the patient's gender by pressing Male or Female.
- Press Name to enter the patient's name. An English keyboard will pop up at the bottom of the screen. A partial keyboard with international symbols corresponding to the installer-selected language may be displayed at the top of the screen.
- When finished entering the name, press ENTER on the bottom keyboard. The touch screen will return to the printer interface window, and the name will appear on the graphic of the label to be printed.
- Follow the preceding procedure to enter the ID, Tech Line 1, and Tech line 2. Tech line 1 and tech line 2 are typically used to enter the techniques as appropriate for the record. A maximum of 30 characters may be entered per line.
- Enter the patient's date of birth by pressing the up or down arrows to the right of the Month, Day, and Year.
- Press Clear to clear the label, if desired.

BEFORE PRINTING:

- Check all information on the graphic of the label to be sure it is correct. The date and time are inserted automatically. Confirm that the touch screen clock is set correctly to ensure correct printing of the date and time.
- Ensure that the correct printer is selected from the **Select Printer** window. The generator will only be compatible with the selected printer.
- Press **Print** when ready to print the DAP label.
- Pressing **Close** will exit the DAP printer interface window and return to the normal console operating mode.

NOTE:
The paper or labels used in the printer must meet all applicable regulations. Medical grade paper or labels, approved for medical records, must normally be used.

4.5.3.7. AK (Air Kerma calculation algorithm)

The AK function is alternative to the DAP devices and it is only available if this function has been enabled in programming. AK calculation can be referred to one tube only: this means that in case of two tubes-generators, only one tube can be configured in order to use this calculation algorithm.

When AK has been enabled, the DAP indications visible on the touch screen will be changed in AK.

During a fluoroscopy procedure the AK algorithm shows the kerma rate (in mGy/min) and when the X-ray emission is terminated AK algorithm will show the cumulative dose value (in mGy).
In the same way the dose delivered during a radiographic procedure will be added to the cumulative dose value by the AK algorithm.

It is also possible to **Reset** and **Test** the AK virtual device and **Print** the calculated cumulative dose value. Make reference to the previous paragraph.

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WARNING:
the air kerma dose value calculated by the AK algorithm has a precision of the ± 35% in case of the X-Ray emission is made at the minimum focal distance (SID = 115 cm).
In case the focal distance is increased the precision of the algorithm will decrease.

WARNING
As this is a calculated dose value, it is important to understand that any kind of external additional filtration added into the X-ray beam will halter the precision of the algorithm. RXi system is not designed to manage additional collimator filters.

WARNING
Reset the AK device before starting any new patient examination!

4.5.3.8. X-Ray lockout button

	X-ray exposures cannot be made when this button is pressed. This is a safety feature that may be activated when personnel are working near the X-ray beam. The message **X-Ray Lock Out Active…** will be displayed when this function is enabled

4.5.3.9. AEC LOCK button

	Locks the initial AEC exposure time, such that the AEC exposure will remain constant for the duration of the injection. This button is only available if a digital-enabled receptor has been selected.

4.5.4. System utilities

From the main console menu, press **System Utilities**. A pop-up window will be displayed, requesting a password. Enter the password to go to the system utilities menu.
The factory-default password is **1, 2, 3, 4**; pressed in sequence. However, the factory-default password may be changed by a service engineer.

- Press **Clear** to cancel an incorrect password.
- Press **Cancel** to return to the main console menu.
- Press **Accept** to access the system utilities menu. After a brief delay, the system utilities screen will be displayed. The message **Access Denied** indicates that an incorrect password was used.

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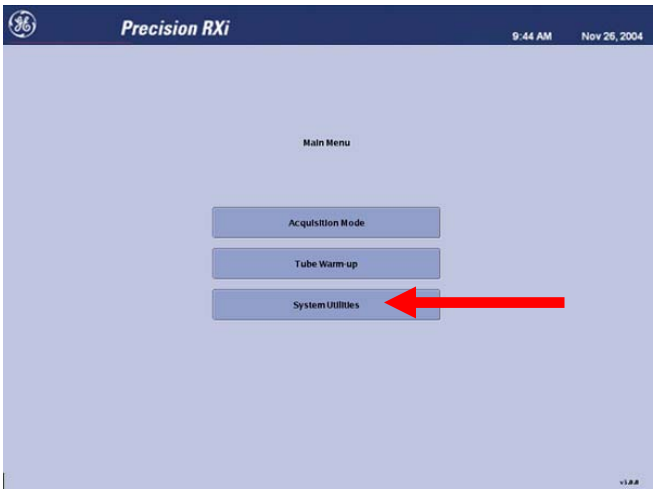

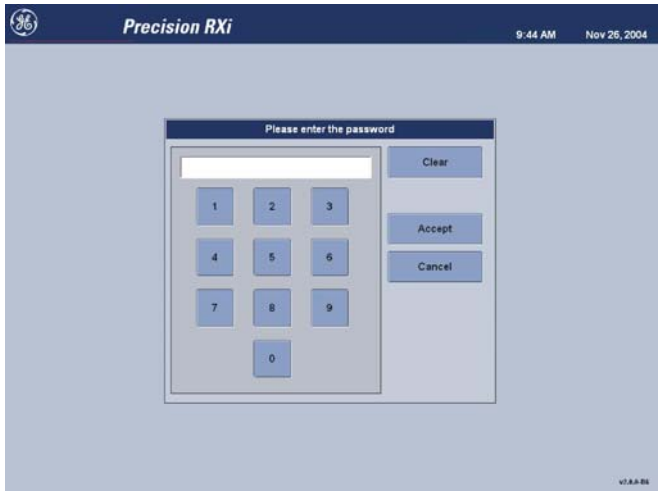

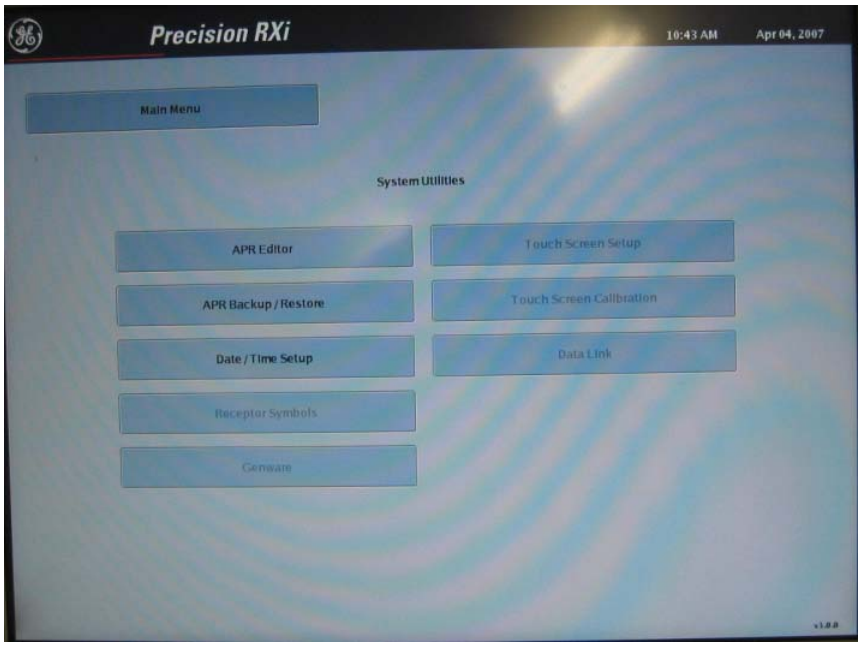

The system utilities menu allows access to the following functions:

Main Menu	Press to return to the main console menu.
Apr Editor	Allows the APR to be edited. Changes may be saved to memory.
Apr Backup And Restore	Allows the APR data to be backed-up, and backed-up APR data to be restored. The factory-default APR data is available in several languages.
Date / Time Setup	Allows the date and time to be modified.

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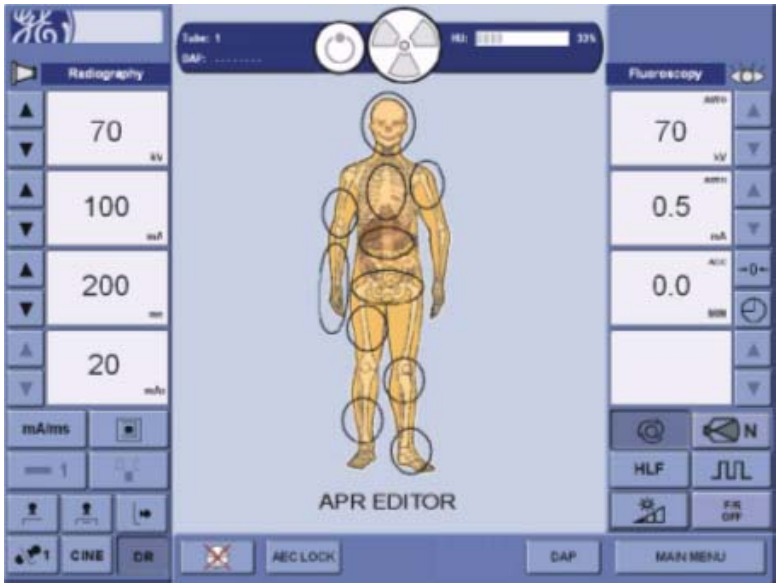
4.5.4.1. APR EDITOR

NOTE:
It is strongly suggested that you review the subsection ANATOMICAL PROGRAMMING SELECTOR in section 4.5.3.4 before proceeding. A good understanding of the terminology and APR menu structures is needed to make APR changes.

1 From the system utilities menu, press **APR Editor.** A screen similar in appearance to the normal operating screen will be displayed. However, as a reminder that you are in APR editor mode, the word **APR EDITOR** will be displayed in the APR window.

2 Refer to the applicable subsections (following) for the procedures to change parameters and technique for existing APR items, and to edit, add, or delete APR, procedural, or menu items.



NOTE:
The above console display is typical. The display on your system may vary depending on programming and technique selections.

NOTE:
*When a region of interest (i.e. SKULL) is selected, a pop-up menu will appear similar to that in normal APR mode. In addition to "new" <**Add**>, <**Edit**>, and <**Delete**> buttons, a <**Move Up**> and <**Move Down**> button will be displayed.*
*The <**Move Up**> and <**Move Down**> buttons allow the items in a menu or submenu to be rearranged. To do this, select the item to be moved. This will highlight the item. Press <**Move Up**> to move the selected item up in the list, and <**Move Down**> to move the selected item down in the list.*

***WARNING**:*
When adding or editing the apr data on the touch screen console, the revised apr file should be backed up via a usb key storage device. If a touchscreen failure occurs and the apr data was not backed up, you will need to contact the factory in order to recover the data, if possible.

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To change parameters or techniques for an existing APR item:

1 Select the APR item to be changed. If the APR item is in a submenu of a menu or procedural item, select the parent menu item or procedural item, then press **Open Sub-Menu**. It may be necessary to drill down through several submenus to find the desired APR item.

2 When the selected APR item is highlighted, select the patient size. The desired parameters / technique may be changed for that patient size (rad / fluoro kV and mA, mAs, ms, density, AEC / mA/ms / mAs, focal spot, film screen, AEC fields, image receptor, AEC lock, fluoro mode (continuous / pulsed fluoro / HLF), I.I. mode, ABS). Repeat for all patient sizes for that APR item as required. The highlight will change to red when the programmed APR has been altered.

3 Repeat steps 1 and 2 for other APR items within that menu or submenu, if applicable.

4 Press **BACK** when finished changing APR items in that menu / submenu. This may need to be done more than once to return to the top APR menu for the selected region of interest. A pop-up window will display asking if you wish to save the changes. Press **YES** to save the changes; **CANCEL** cancels the changes.

NOTE:
When editing or adding an APR item, menu item, or procedural item, an English keyboard will pop up at the bottom of the screen. A partial keyboard with international symbols corresponding to the installer-selected language may be displayed at the top of the screen.
An ID code window may be displayed to the right of the window for the item text. The ID code is used by some imaging systems, and use of the proper code synchronizes the APR's between the touch screen console and the imaging system. Refer to the appropriate imaging system documentation for valid ID codes.
Touching the ID code window will move the cursor into that window, allowing entry of the ID code. THE I.D. CODE IS NOT AVAILABLE ON ALL SOFTWARE CONFIGURATIONS OF THE TOUCH SCREEN.

To edit the name of an APR item:

1 Select the APR item as per step 1 under **"To change parameters or technique for an existing APR item".** The selection will be highlighted.

2 Press **Edit**. Keyboard(s) will display on the screen as described above, with the current name of the APR item highlighted.

- Press **CANCEL** on the lower keyboard to exit without changing the name.
- Press **DEL** to delete the highlighted name on the keyboard.
- Type in the new name for that APR item. Use the **BACKSPACE** key to back space if corrections are needed.
- Add / edit the ID code if desired (if displayed).
- Press **ENTER** when finished.

To delete an APR item:

1 Select the APR item to be deleted. The selection will be highlighted.

2 Press **Delete**. A pop-up window will display asking if you are sure you want to delete this item. Press **YES** to delete the item; **NO** cancels the deletion.

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To add an APR item:

1 Select the appropriate location to add the APR item. An APR item may be added directly to a main APR menu, or may be added to a submenu of another menu or procedural item.
If the APR item is to be added to a submenu of a menu or procedural item, select the parent menu item or procedural item, then press Open Sub-Menu. It may be necessary to drill down through several submenus to find the desired location for the new APR item.

2 Press Add. A pop-up window will display allowing you to select three item types to be added. Select APR Item (this is the default selection, and the only available selection if adding to a procedural menu).

3 Press **OK** to continue. **Cancel** will cancel this action.

4 Keyboard(s) will display on the screen as described previously.

- Type in the name of the new APR item.
- Add the ID code if desired (if displayed).
- Press **ENTER** when finished.
- The new APR item will appear on the selected menu or submenu.
- Change the parameters and technique as per the subsection "To change parameters or technique for an existing APR item".

To add, edit, or delete a procedural item:

1 To delete a procedural item, follow the steps in **"To delete an APR item".** Doing so will also delete the submenu associated with that procedural item.

2 To edit a procedural item, follow the steps in **"To edit (change the name of) an APR item".**

3 To add a procedural item, follow steps 1 to 3 in **"To add an APR item",** except select **APR Procedure** in step 2**.**

4 Keyboard(s) will display on the screen as described previously.

- Type in the name of the new procedural item.
- Add / edit the ID code if desired (if displayed).
- Press **ENTER** when finished.
- The new procedural item will appear on the selected menu or submenu.
- Select the newly added procedural item. The selection will be highlighted.
- Press **Open Sub-Menu**. A "generic" APR item named **FIRST ITEM** has been automatically inserted in that submenu.
- You may now edit the name and change the parameters and technique for that APR item, and add additional APR items for that procedural item as per previous steps.

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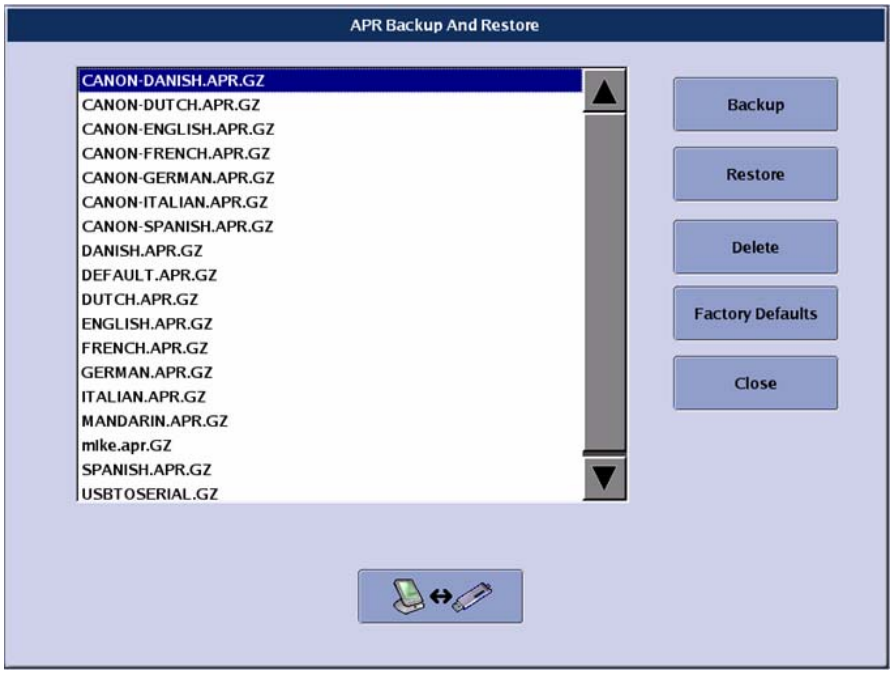
To add, edit, or delete a menu item:

1 To delete a menu item, follow the steps in **"To delete an APR item".** Doing so will also delete the submenu associated with that menu item.
2 To edit a menu item, follow the steps in **"To edit (change the name of) an APR item".**
3 To add a menu item, follow steps 1 to 3 in **"To add an APR item",** except select **APR Menu** in step 2**.**
4 Keyboard(s) will display on the screen as described previously.

- Type in the name of the new menu item.
- Add / edit the ID code if desired (if displayed).
- Press **ENTER** when finished.
- The new menu item will appear on the selected menu or submenu.
- Select the newly added menu item. The selection will be highlighted.
- Press **Open Sub-Menu**. A "generic" APR item named **FIRST ITEM** has been automatically inserted in that submenu.
- You may now edit the name and change the parameters and technique for that APR item, and add additional APR items for that menu item as per previous steps.

4.5.4.2. APR Backup / restore

1 From the system utilities menu, press **APR Backup / Restore.** A pop-up window will display showing the available backup files and the factory-default APR files in various languages. Pressing **Close** will exit the backup and restore menu.
2 Refer to the applicable subsections (following) for the procedures to back-up the current APR data, and to restore saved APR data. The entire APR (parameters and techniques, APR text, menu structures, etc) is backed up.



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To back-up current APR data:

1 Press **BACKUP**.
2 Keyboard(s) will display on the screen as described previously.
- Type in the name of the new backup file.
- Press **Enter** when finished. The console will return to the APR backup / restore menu.
- A pop-up window will display indicating that the backup was successful. Press **OK** to continue.

To restore backed-up APR data:

1 Select the APR data file to be restored. The selection will be highlighted.
2 Press **Restore**.
3 After a brief delay, a pop-up window will display indicating that restore was successful. Press **OK**.

To delete an APR data file:

1 Select the APR data file to be deleted. The selection will be highlighted.
2 Press **DELETE**. A pop-up window will display asking if you are sure you want to delete this file. Press **YES** to delete the file; **NO** cancels the deletion.

To restore the factory default APR data:

1 Press Factory Defaults.
2 After a brief delay, a pop-up window will display indicating that restore was successful. Press **OK**.

The upload and download functions allow backup files on the touch screen console to be saved to an external USB memory sick, and allow saved backup files to be downloaded from an external USB memory sick to a touch screen console.

These functions require special hardware and software, and are intended for use by authorized service personnel only. Make reference to the System Installation Manual 5123446-100 chap. “Backup and Restore”

4.5.4.3. Sound control and Date & Time setup

See service manual for details.

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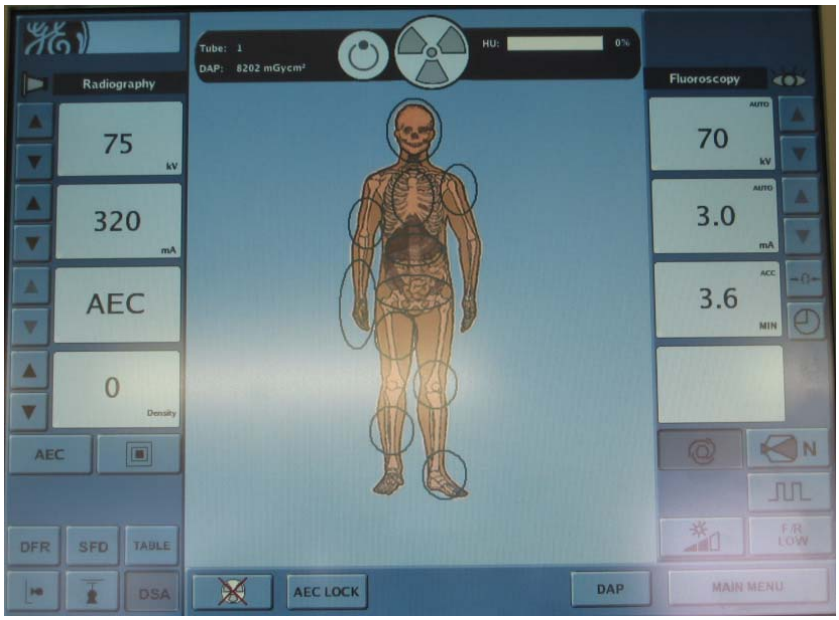
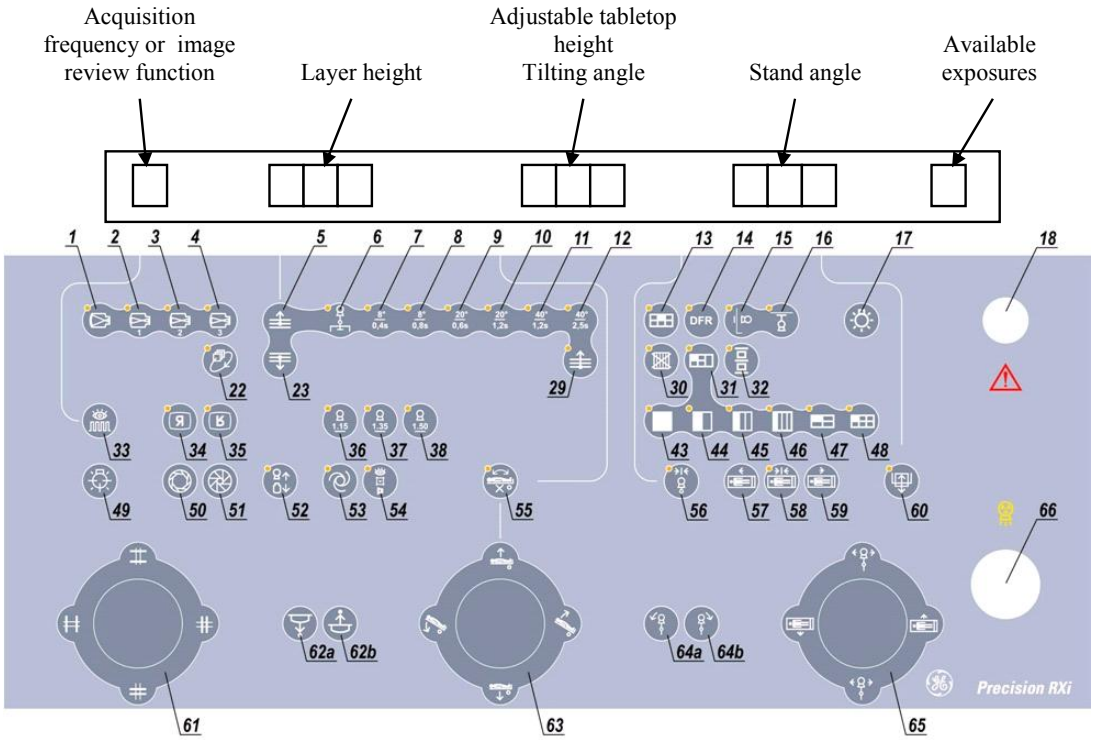
4.6. Common function controls between the generator touch screen and table console



Generator touch screen


Acquisition frequency or image review function
Layer height
Adjustable tabletop height
Tilting angle
Stand angle
Available exposures
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
22 23 29 30 31 32
33 34 35 36 37 38 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 66
61 62a 62b 63 64a 64b 65
DFR
Precision RXi

Positioner console

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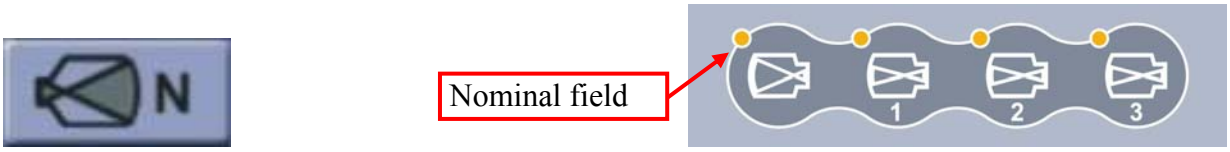
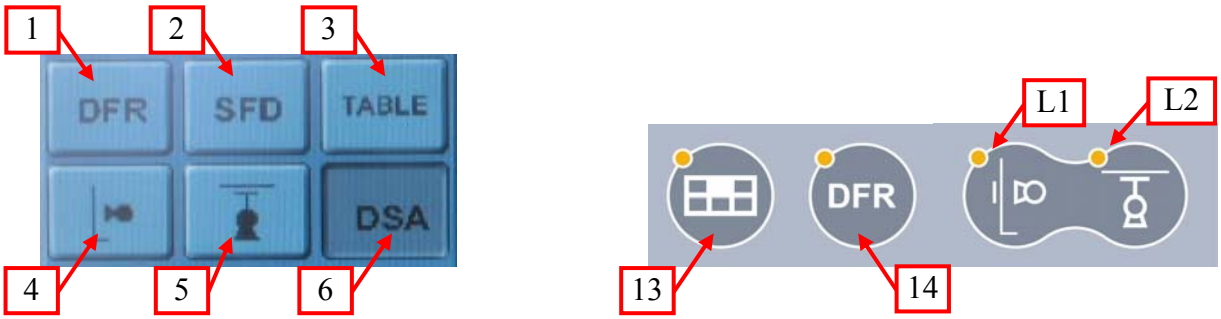
4.6.1. Image Intensifier magnification



The table console push buttons or generator touch screen button can be used to change the magnification.
If the generator touch screen is off, the system will go back to the table console nominal field.

4.6.2. Receptors



[1] DFR digital fluoro radiography
[2] SFD spot film device
[3] Table direct mode
[4] Wallstand
[5] OTS overhead tube suspension
[6] DSA digital subtraction angiography

If the generator touch screen push buttons [3], [4] or [5] are selected, the table console push buttons (13) and (14) will be deactivated.
To reselect the (13) or (14) table console push buttons it will be necessary to push them again on the table console or push [1] or [2] on touch screen generator

The DFR table console push button (14) and DSA [6] generator touch screen push button are automatically selected when a DSA exam is selected on the digital monitor.

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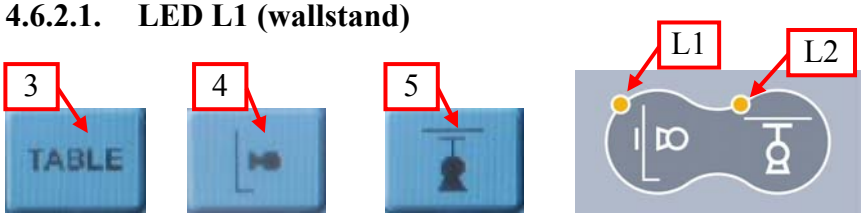
4.6.2.1. LED L1 (wallstand)



When **table direct** [3] mode or **OTS** [5] suspension mode is selected on generator touch screen the following conditions can occur:

1) LED (L1) OFF - when the X-ray tube beam is perpendicular to the table

2) LED (L1) ON – when the X-ray tube is rotated and the beam is not perpendicular to the table.

3) LED (L1) FLASHING – when a cassette is inserted into the wallstand. This indicates that X-rays are inhibited.

When the wallstand [4] mode is selected following conditions can occur:

1) LED (L1) LIT – indicates the table or OTS are positioned to allow a radiography on the wallstand and there is a cassette in the wallstand bucky.

2) LED (L1) FLASHING indicates that X-rays are inhibited for one of the following reasons:

- For a table with wallstand only system
  - The table is not rotated to 90°
  - The X ray housing is rotated
  - The cassette is not present in the wallstand bucky
  - The cassette in the bucky has already been exposed
- For a wallstand with manual collimation OTS system
  - The table X-ray tube is rotated
  - The cassette is not present in the wallstand bucky
  - The cassette present in the bucky has already been X ray exposed
- For a wallstand with automatic collimation OTS system
  - The table X-ray tube is rotated
  - The cassette is not present in the bucky
  - The cassette in the bucky has already been X ray exposed
  - The OTS is not aligned with the wallstand (make reference also to paragraph 1.9)

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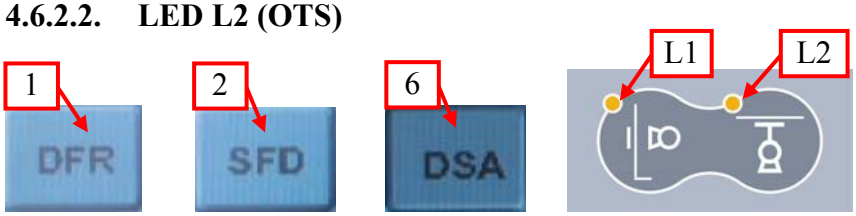
Conditions of use for automatic collimation OTS and wallstand

1) When the focal distance is between 90cm - 205cm and the OTS tube is rotated towards the wallstand the collimator will enter automatic mode. In this mode X-rays can only be made at a focal distance of 100cm or 180cm; otherwise X-rays will be inhibited as indicated by LED (L1) flashing.

2) If the focal distance is outside 90cm – 205cm then the collimation will switch to manual mode and LED (L1) will be flashing to indicate that exposures are inhibited when :

1) The X ray table tube is rotated away from the table
2) The cassette is not present in the wallstand
3) The cassette present in the wallstand has already been exposed

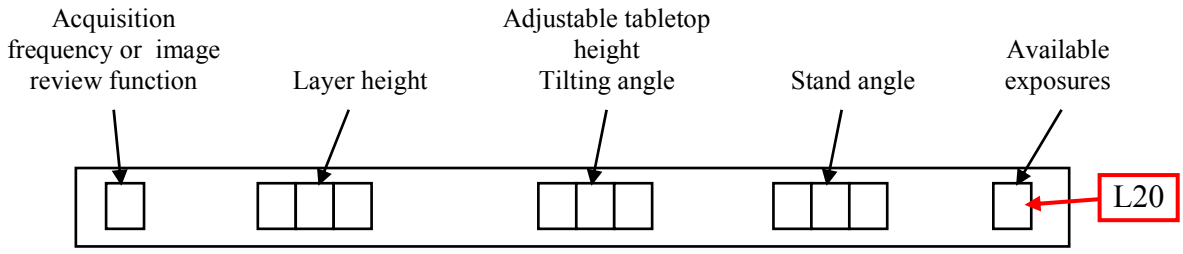
4.6.2.2. LED L2 (OTS)



1) LED (L2) OFF indicates the OTS is in its parked position.

2) LED (L2) ON indicates OTS is not in its parked position. In this situation movements of the table tube stand, elevation, tilting, tomography and focal distance will be inhibited to prevent a collision between the table and OTS.

4.6.3. Positioner console display



The console table display LED (L20) will display 1 if the cassette is present in wallstand.
The console table display LED (L20) will display 0 if the cassette present in the wallstand has already been exposed.
The console table display LED (L20) will be OFF if no cassette is present in the wallstand.

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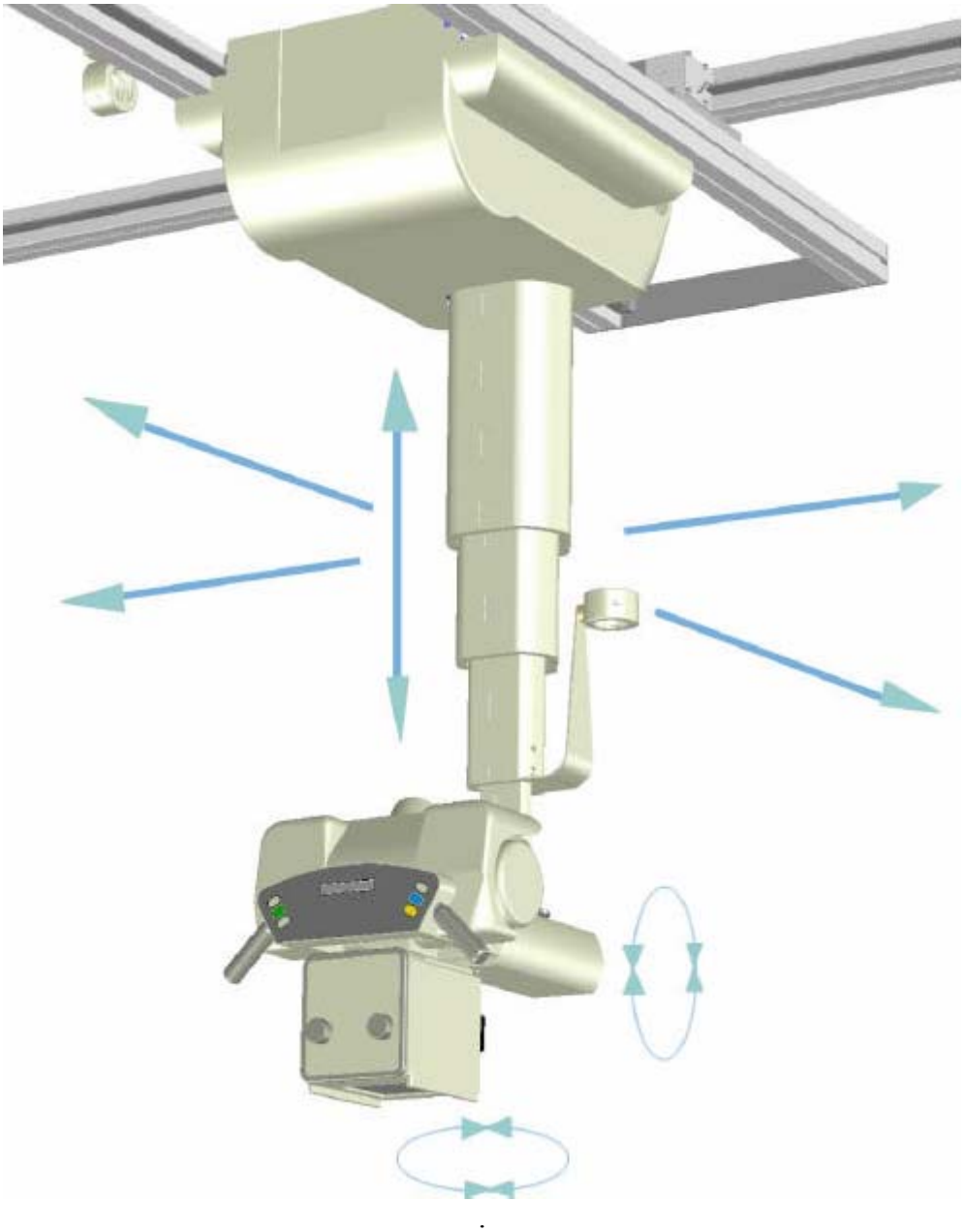
4.7. OTS (Overhead Tube Suspension)

4.7.1. Movement

The following picture shows the options for moving and positioning the X-ray tube.



It is also possible to rotate by hand the collimator to ± 90°
It is possible to lock the collimator with a screw in the center position in case the country regulatory do not allows the ± 90° collimator rotation.

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4.7.2. Braking

The linear movements use electromagnetic brakes that work in presence of continuous current. In contrast, the rotating movements of the tube assembly use electromagnetic safety brakes, whose braking action is assured by the use of permanent magnets.
Press the brake control push buttons to release the brakes and position the OTS. Release the same push buttons to re-engage the brakes..
For rotating movements there are some position mechanical indicators every 90°. One or more position mechanical indicators are generally used for the transversal movements.

The moving of the mobile parts must be carefully done to avoid collision risks and/or injury to people or equipment in the examination room.

The unit must not be subjected to dangerous stresses such as the violent stop of the mobile parts on the end of travel bumper; the extreme torsion of the functioning electrical cable; the movements forcing without the brakes unlocking; etc.

4.7.3. Control panel.

In the following picture the control panel is shown. The handles are covered by synthetic rubber.

The control panel (standard version).

Use only the handles on the control panel to move the OTS and/or tube assembly.

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In the control panel there are push buttons for the brake control and display of focal distance and X-Ray beam incidence angle.

Pos.	Description
01	Push button which unlocks the brake of the tube horizontal support arm rotation on the vertical axis
02	Push button which unlocks the brake of the tube longitudinal movement
03	Push button which unlocks the brake of the tube rotation on the horizontal axis
04	Push button which unlocks all linear movements brakes at the same time
05	Push button which unlocks the tube transversal movement
06	Push button which unlocks the tube vertical movement
07	Synthetic rubber handle
08	X-ray beam inclination angle indication
09	Focal distance display
10*	Collimator setting chart
11*	Control knob for regulation of the collimator shutter
12*	Control knob for regulation of the collimator shutter
13*	Push button control for lamp

* For the specific instructions, please to the specific collimation documentation.

4.7.4. Moving the OTS

The required effort to move the OTS is minimized through mechanical balancing.
The movements are made from the control panel that has functional handles (**07**) that are covered by synthetic rubber. These ergonomically designed handles permit the user to reach the push buttons that unlock the brakes.
The control panel also offers all the controls in a small area and uses different colors to indicate movement along the three axes.
The longitudinal travel is obtained by the bridge sliding along the longitudinal aluminum rails after unlocking the electromagnetic brake using push button (**02**).
The transversal movement is obtained by the carriage sliding within the bridge after unlocking the electromagnetic brake using push button (**05**).
The longitudinal and transversal movements can be done at the same time after unlocking both brakes using push button (**04**).
The vertical travel is obtained by extending or reducing the length of the stand telescoping sections after unlocking the brake push button (**06**).

4.7.5. The focal distance indicator

The digital indicator placed on the control panel (**09**) indicates the distance between the focal spot and the film in the cassette (value expressed in cm). If requested, it can be calibrated to indicate the distance between the focal spot and the patient tabletop.

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4.7.6. Movements of the tube support arm.

The arm that supports the tube can rotate around the stand vertical and horizontal axis and can be blocked in any position it can assume.
The movements are always possible by using the handles (**07**) and after unlocking the corresponding electromagnetic brake (**01, 03**).
For both of these rotation movements the angular detent positions, which are orthogonal to each other, are mechanically put in place.
The brakes used for these movements are safety brakes. They are not affected by the equipment power supply state because their braking action relies on a permanent magnet.
When the power is on the current flowing through the brake electrical coil creates a magnetic field and doubles the braking action of the permanent magnet.

4.7.7. Beam angle

The rotation of the tube on the horizontal axis changes the beam angle towards the exam table top. The angulation value is shown by the LCD display (**08**).

4.7.8. Alignment of the beam towards the receptive devices

If requested one or more mechanical indicators (cams) can be inserted in the rails. They will indicate the alignment position of the X-Ray beam towards the receptor devices.
Passing through the transversal bridge, the cam on the longitudinal rail generally shows the longitudinal beam alignment position with the table bucky centre or the distance from the wallstand.
The cam on the transversal frame indicates the transversal beam alignment.
A pair of these cams is supplied with the equipment and can be equipped with a micro switch to use in signaling and/or interlocking circuits.

4.7.9. Ceiling stand collimator

4.7.9.1. Automatic collimation.

When the cassette holder is inserted in the wallstand both the size and the orientation of the cassette are recognized.
This information is used to position the collimator blades to correspond to the cassette dimensions.
Changes of field dimensions can be manually done using the collimator controls; these changes are accepted if they are still within the cassette size.

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4.7.9.2. Manual collimation

The collimator controls change the blade position.
An approximate indication of the dimension of the cassette is displayed on the collimator overlay. There are different kinds of scales depending on the focal distance values.
The collimator light can be turned on for 30 seconds using the push button. This illuminates the X-ray field to allow alignment with the receptor.

4.7.10. X-Ray exposure

To take a radiography:

1) Centre the beam toward the bucky;
2) Insert the cassette into the bucky;
3) Centre and adjust the field on the patient;
4) Set the exposure values and technique on the generator;
5) Press the preparation button and, when the generator is ready for the exposure, press the exposure button.

The grid in the bucky starts working and authorizes the exposure execution.

4.7.11. Use of the tube with a wallstand

With the vertical travel of the tube and wallstand it is possible to take not only the thorax radiography, but also the lower limbs.

To take a radiography with a wallstand:

1) Put the stand in the position indicated by the centering cam;
2) Rotate the tube 90° on its support arm in order to align and centre the beam toward the wallstand.

Centre and place the patient, insert the cassette in the wallstand, set the exposure technique on the generator and take the radiography.

WARNING:
All patient's parts that are at risk must be always protected by additional shielding devices according to the radiation safety law.

4.7.12. Unbalancing of the OTS telescoping vertical travel.

Near the end of life of the balancing springs of the OTS telescoping vertical travel, the metal fatigue and wear appears on their surface and sides.

A spring breaking causes a deficit of some kilos in the telescoping balancing system; the stand can be used only after the broken spring replacement.

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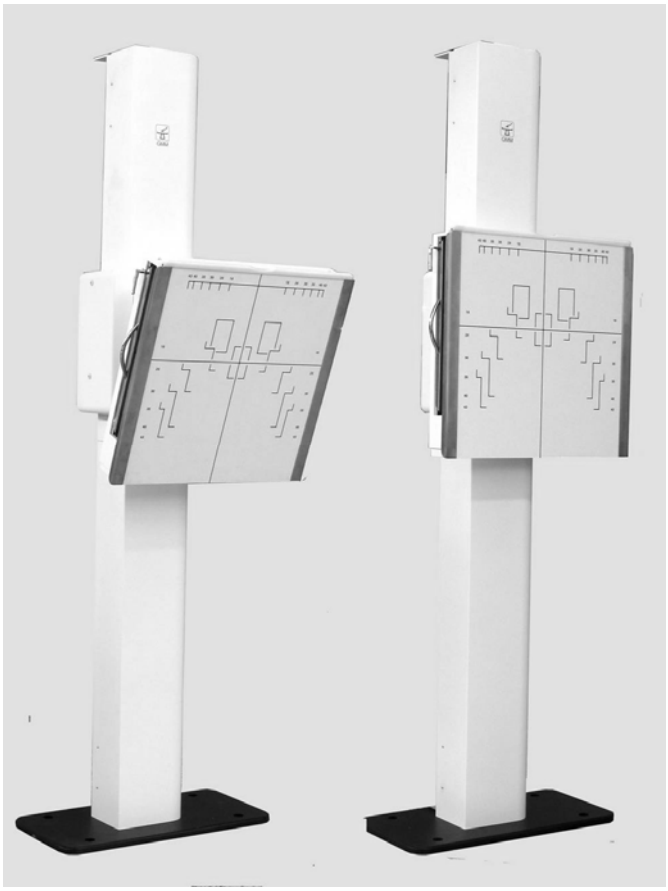
The spring breaking means that also the others are near their working cycle end; for this reason, it is necessary to replace all springs of the telescope balancing system, in order to keep the equipment safe and to avoid the frequent repetition of the same problem.

4.8. Wallstand

WS-T vertically adjustable with tilting device
WS - vertically adjustable



WS-T **WS**

4.8.1. Safety measures for the functioning

Instructions and rules pertaining to this equipment and are in force in a country must be respected by the operator and the installer. The unit must work only in rooms that are used for medical aims (refer to regulations in force). The unit is not planned to be used in rooms that are explosion risks. The equipment can be used and subjected to maintenance operations only by authorized and trained personnel. In particular, they must know the possible dangers of incorrect equipment use and the residuals risk. For mounting, functioning, use and maintenance of the unit, every person's duties must be clearly established and respected; in this way, from the safety point of view there is no doubt in the tasks subdivision. It's necessary that the person who is responsible for the equipment controls

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constantly the unit working in maximum safety conditions, the room order and cleanliness, and the sufficiency of space at the personnel's disposal in order to guarantee free and safe movements. The user must keep the working area around the unit clean and without substances that could provoke sliding. The operator's absolute attention is a safety essential element. For the unit use the local rules about safety and accident prevention are in any case valid, as the safety instruction listed in this manual.

4.8.2. Model WS

The wallstand is used to make exposures on a bucky. The wallstand is designed for installation of a manual or automatic bucky.
The bucky can be moved using the vertical carriage from 400 mm to 1765 mm above the floor (measured to the center of cassette).
The vertical carriage, including bucky, is floating weight-compensated and is mechanically held in each position.
The brake grip can be released with one hand while the bucky is moved vertically.
The distance between the wall and the front panel ranges from 390 to 460 mm depending on the fastening type.

4.8.3. Model WST

In addition to the functions described above, the model WS-T allows the bucky to be tilted from the vertical position to the horizontal position (+90°) or to -20°. The distance of the wall-front panel ranges from 650 to 720 mm, depending on the fastening type.

4.8.4. Note

Installation can be made with fixation onto the floor or with fixation onto the floor and the wall.
The wallstand can be configured in the factory to load the cassette from the left or right side; this must be specified when ordered.

4.8.5. Area of application

Exposures of standing and sitting patients from the head to the knee.

IMPORTANT NOTE:
Proper use of this product requires that operating personnel be familiar with the operating instructions.

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4.8.6. Moving the Bucky vertically

model WS

model WS-T

The handle for the vertical bucky movement is on the right side of the column.
To unlock the brake of the vertical movement rotate the handle counter-clockwise.
Move the carriage to the desired position and lock the movement by rotating the handle clockwise.

4.8.7. Rotating the bucky on its axis (model WS –T only)

For exams on patients on stretcher it is useful to rotate the bucky on its axis of 90° so that, when the bucky is tilted to its horizontal position, the cassette tray is loaded from the front.

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4.8.8. Tilting the bucky to +90°or -20° (model WS-T only)

The handle for the bucky tilting movement is on the back left side of the bucky. Move the handle toward the carriage and tilt the bucky to the desired position: +90° (horizontal) or -20°. Release the handle to lock the bucky. The handle for the bucky rotating movement is on the back right side of the bucky holder.

4.8.9. Loading the cassette

To release the cassette tray push the small lever at the top of the cassette tray slot; the cassette tray can now be removed from the bucky and loaded.

To load the cassette:

1) Using the proper handle pull out the cassette tray out of the bucky until the stop is reached;
2) Rotate clockwise the lever that unlocks the jaws that block the cassette;
3) Open the jaws enough to insert the cassette in use;
4) Position the device or the cassette vertical stop in the housing, in correspondence with the vertical side dimension of the cassette in use;
5) Insert the cassette in the jaws, leaning it on the vertical stop;
6) Rest the jaws against the cassette;
7) Rotate clockwise the lever to lock the jaws;
8) Insert again the cassette in the bucky, using the proper handle.

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4.8.10. Setting the exposure position for WS

Release the vertical brake and move the bucky to the height of the exposure subject.
Position the patient in front of the bucky. Set the tube unit focal distance and adjust the exposure field using the light field in the collimator.

4.8.11. Setting the exposure position for WS-T

With the WS-T, the bucky can also be tilted +90° and -20°.
Release the vertical brake and move the bucky to the height of the exposure subject. If necessary, rotate the bucky. Unlock the tilting movement by pushing the tilt handle and position the bucky at the desired tilt angle. Position the patient in front of the bucky. Set the focal distance and adjust the exposure field using the light field in the collimator.

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4.8.12. Performing X-rays

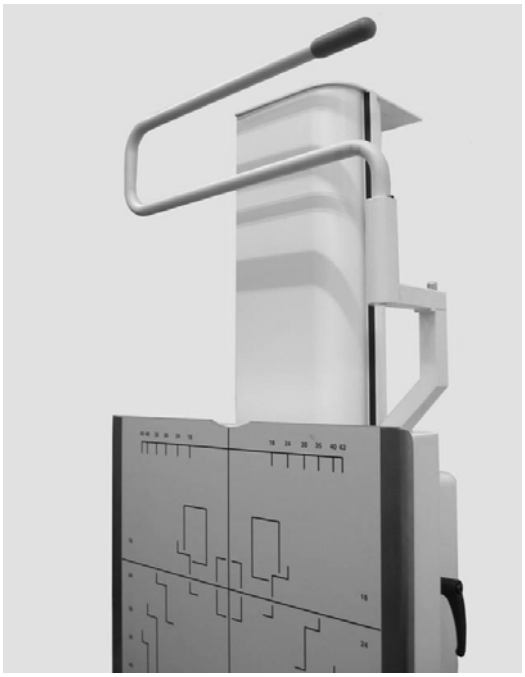
The operations to do to perform an x-ray are the following:

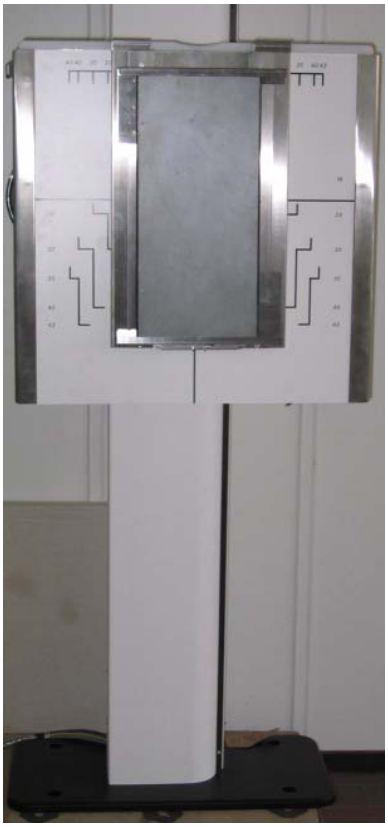
1) Center the x-ray source to the bucky
2) Center and collimate on the patient the area that is to be radiographed
3) Insert the cassette in the bucky
4) Set the values and the exposure technique on the generator user interface
5) Check to make sure everything is ready for exposure.
6) Instruct the patient: please take a breath and hold it! Trigger exposure.
7) Push the preparation button and, when the generator is ready for the exposure, push the exposure button.
8) The grid in the bucky starts moving and performs the procedure.

WARNING:
All patient's parts that are at risk must always be protected by additional shielding devices according to the radiation safety law.

4.8.13. Accessories

Arm support and external cassette holder.





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4.8.13.1. External cassette holders use

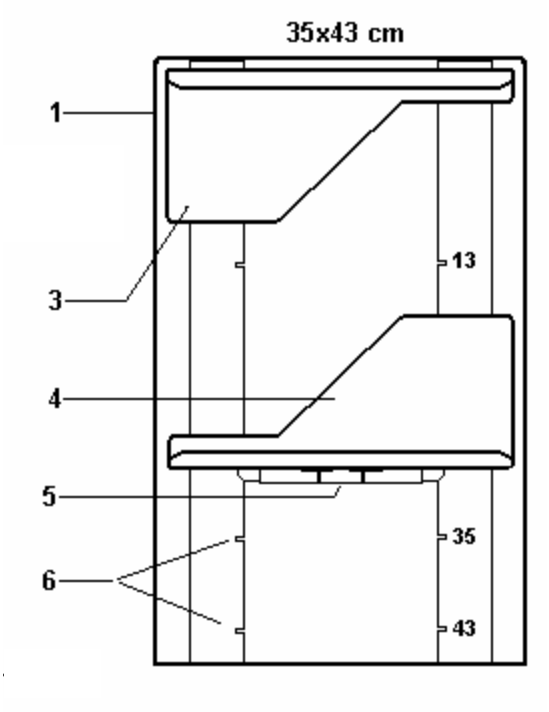
The external cassette holder allows the user to perform x-rays without using the grid with cassettes placed outside the bucky.

The cassette holder is directly fasten to the upper part of the frame that supports the bucky and leaned to its front panel. According to the maximum cassette size that they can get, they have different dimensions and weights that change according to the bucky vertical movement balancing conditions.

So, it is necessary to always lead the bucky vertical movement when the brakes are un-locked.

To insert the cassette in the external cassette holder do as follows:

1) Low the lower wing that holds the cassette by acting on the levers that un-lock its movement.
2) Insert the cassette in the upper wing of containing and lean it to the cassette holder.
3) Get close again the lower wing of containing to the lower side of the cassette. The lower wing stopping device in position releases automatically.



1	35x43 cm external cassette holder
3	Cassette superior clamp
4	Mobile cassette clamp
5	Unlocking device for the mobile cassette clamp
6	Stop notches in mobile wing position

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4.9. OTS, Table, Wallstand and Manual / Automatic Collimator

OTS = Overhead Tube Suspension (ceiling tube suspension with X-ray assembly).
WS = Wallstand (vertical wallstand with potter bucky).
Table = Positioner.

4.9.1. Cassette-sensing device

The wallstand is equipped with a sensor detecting that the cassette is in; whenever a cassette is inserted in the WS, it will be possible to take exposures only on the WS itself (OTS plus WS, or 90° positioner plus WS) while any other X-ray source will be deactivated (Digital Fluoroscopy DFR, Spot Film Device SFD, tabletop, OTS free technique, Digital Subtracted Angiography DSA).
This sensor prevents any involuntary double exposure of the cassette since once the exposure is taken, X-rays will be inhibited until the operator removes the exposed cassette and inserts a new one in the bucky.

4.9.2. X-ray beam alignment

In a Manual Collimator-system, the alignment between the OTS (or positioner) and the Wallstand is performed by the user based on the luminous beam of the collimator and the mechanical cam helping the transversal centering.
In an Automatic collimator-system (PBL-Positive Beam Limitation), the user still has to execute the alignment between the OTS (or positioner) but, compared to the manual collimator system, the Automatic one can recognize some factors, such as focal distance and orientation of the X-ray assembly in the OTS (please make reference to the following paragraphs). Additionally, a mechanical cam signaling that the X-ray assembly is rotated to 180° is used for aligning the positioner X-ray assembly with the wallstand and the centering operation must then be completed based on the collimator light projection.

4.9.3. Automatic collimator

The following summary table shows the automatic collimator functioning conditions applying to those systems including the automatic collimator. FDA standards require that with the PBL (Positive Beam Limitation) feature, the collimator must work in automatic mode within a focal distance range of 90 to 205 cm (see area “B” shown in the following drawing) when the X-Ray beam is perpendicular to the receptor. Beyond this focal distance range or when rotated, the collimator shall always work in the manual mode (see area “A” and area “E” shown in the drawing). Additionally, regulations state that X-rays must be inhibited at any position included within area “B” where it is not possible to precisely define the Focal Distance “F”.

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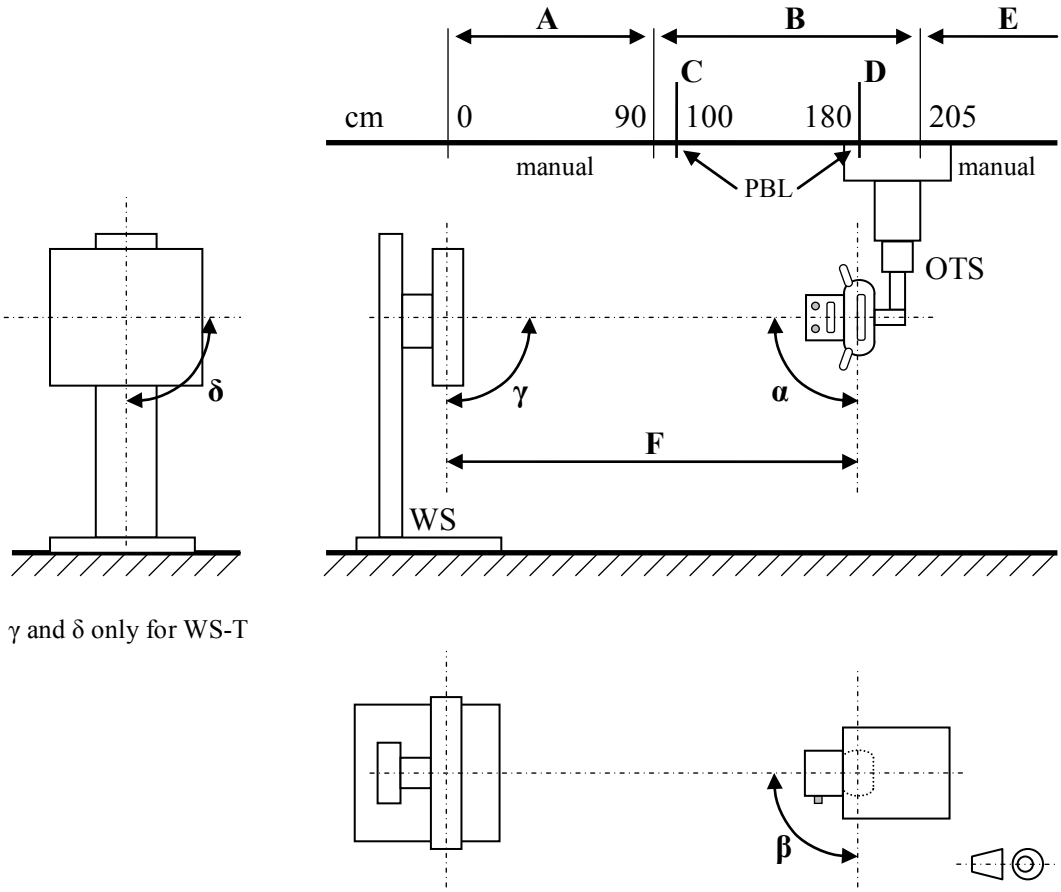
4.9.4. Key for switching the collimator to manual mode (OTS)

The OTS automatic collimator is provided with a key that will place the collimator into manual mode (independently from the OTS position). This key must be used only in the case of a malfunctioning of the PBL (automatic collimation).



γ and δ only for WS-T

Working technique / Receptor	WS condition	FFD / OTS Focal Distance / OTS alignment	Collimator functioning modality	Generator condition
Free Technique OTS	Cassette **NOT** in	any	Manual	X-rays enabled
	Cassette **IN**	any	any	X-rays inhibited
OTS- WS Technique	Cassette **NOT** in	any	any	X-rays inhibited
	Cassette **IN**	OTS at either **C** or **D** (100 or 180 cm) positions, with X-ray assembly properly oriented (angles **α, β,** γ and **δ** = 90°)	Automatic (PBL)	X-rays enabled
		OTS in **B** area but NOT at **C** or **D**	any	X-rays inhibited
		OTS in **B** area with X-ray assembly **NOT** properly oriented (angles **α, β,** γ or **δ** ≠ 90°)	any	X-rays inhibited
		OTS either in **A** or in **E** areas	Manual only	X-rays enabled

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5. Digital system preliminary functions

5.1. Working with patient files

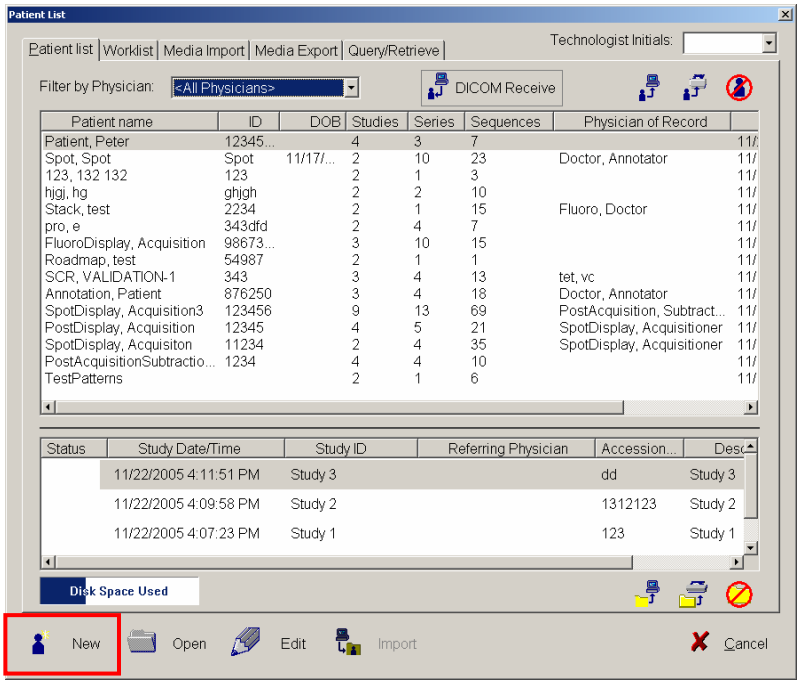
Prior to acquiring images, a patient file must be created. This may be done either by entering the patient data manually or importing the patient data automatically using the **DICOM Work List** feature.

This section will explain the various ways to access and change the patient data.

5.1.1. New Patient File – Entering Patient Data Manually

1. From the ***Main Image*** screen, click on the ***Patient List*** button.

2. Enter *Tech Initials.* This can be done manually or by using the *Arrow* to display *Drop-down* menu of predefined initials.



Patient List Screen

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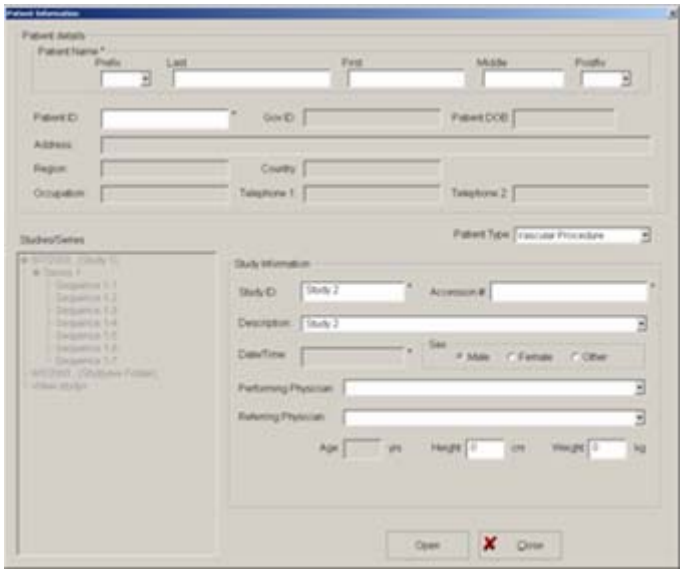
3. From the ***Patient List*** screen click on the New button to open the ***Patient Information*** screen.



New Patient Entry Screen

4. Click the left mouse button to position the cursor over each field where data is to be entered. Use the mouse or either the tab key or enter key on the keyboard to move between entries.

- Some fields may be unavailable – indicated by grayed-out field box. These fields were deactivated for your system. Contact your service agent to have them activated.
- Specific settings for General Acquisition, Review, Reference Display, Printing and Archive Transfer as well as Fluoro, Spot and Sub-Fluoro can be made from the Performing or Referring Physician fields.
- Fill in the fields with as much patient information as is available. Some fields are required and are indicated by an asterisk (*).
- Several of the selections have drop-down menus for quickly selecting data and are indicated by a small downward arrow next to the field.

Prefix	Type in Prefix to be used or use down arrow to select from a list of those previously entered: Highlight selection to be reflected in Patient file.	Dr. MR MS
Postfix	Type in Postfix to be used or use down arrow to select from a list of those previously entered. Highlight selection to be reflected in Patient file	
Patient Type:	Use down arrow to select from available options: Highlight procedure type to be reflected in Patient file.	NONE General Procedure Vascular Procedure

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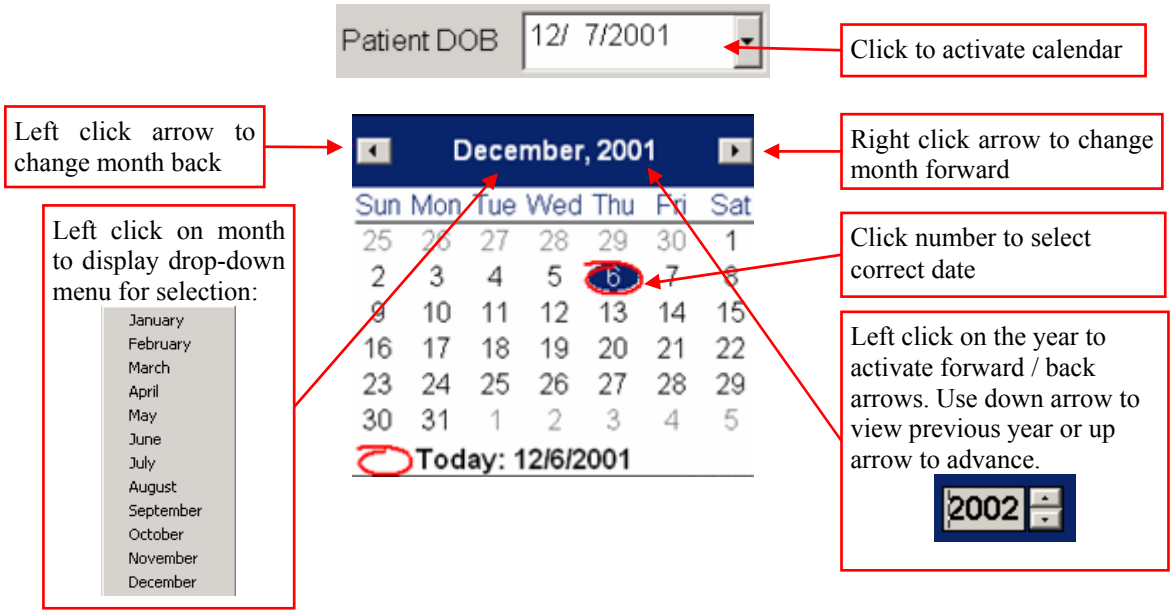
5.1.1.1. Date of Birth Calendar

The Patient DOB/Date Of Birth text box includes a calendar function for selecting the month, date and year. The DOB field and calendar default to current date.

NOTE:
This function must be Enabled within the Service Application.


Patient DOB
12/ 7/2001
Click to activate calendar
Left click arrow to change month back
December, 2001
Right click arrow to change month forward
Sun Mon Tue Wed Thu Fri Sat
25 26 27 28 29 30 1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31 1 2 3 4 5
Today: 12/6/2001
Left click on month to display drop-down menu for selection:
January
February
March
April
May
June
July
August
September
October
November
December
Click number to select correct date
Left click on the year to activate forward / back arrows. Use down arrow to view previous year or up arrow to advance.
2002

5.1.1.2. Complete data entry

When patient data entry is complete, select one of the following options:

Save	The SAVE button saves the patient data to the database. The *Patient List* screen reappears so that additional patient files can be added.
Open	The OPEN button saves the patient data and opens the patient file for acquisition. Patient information will be displayed on-screen.
Close	The CLOSE button cancels this patient data. The patient data recently entered will not be saved. The *Patient List* screen will reappear.

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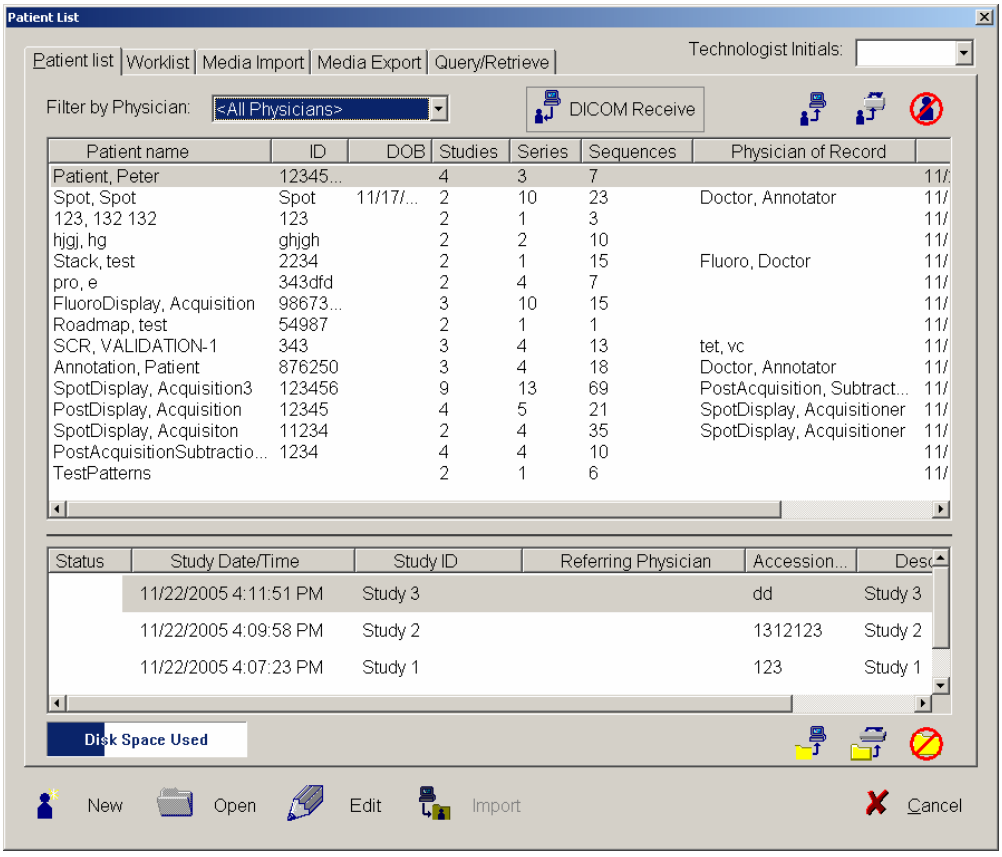
5.1.2. Edit patient data

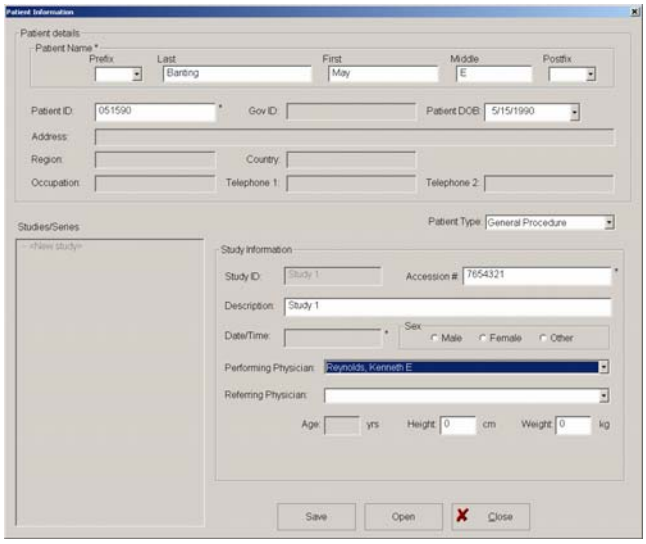
1 From the *Main Image* screen, click on *Patient List* button.

2 The *Patient List* screen will appear.


Patient List
Patient list
Worklist
Media Import
Media Export
Query/Retrieve
Technologist Initials:
Filter by Physician:
<All Physicians>
DICOM Receive
Patient name
ID
DOB
Studies
Series
Sequences
Physician of Record
Patient, Peter 12345... 4 3 7 11/
Spot, Spot Spot 11/17/... 2 10 23 Doctor, Annotator 11/
123, 132 132 123 2 1 3 11/
hjgj, hg ghjgh 2 2 10 11/
Stack, test 2234 2 1 15 Fluoro, Doctor 11/
pro, e 343dfd 2 4 7 11/
FluoroDisplay, Acquisition 98673... 3 10 15 11/
Roadmap, test 54987 2 1 1 11/
SCR, VALIDATION-1 343 3 4 13 tet, vc 11/
Annotation, Patient 876250 3 4 18 Doctor, Annotator 11/
SpotDisplay, Acquisition3 123456 9 13 69 PostAcquisition, Subtract... 11/
PostDisplay, Acquisition 12345 4 5 21 SpotDisplay, Acquisitioner 11/
SpotDisplay, Acquisiton 11234 2 4 35 SpotDisplay, Acquisitioner 11/
PostAcquisitionSubtractio... 1234 4 4 10 11/
TestPatterns 2 1 6 11/
Status
Study Date/Time
Study ID
Referring Physician
Accession...
11/22/2005 4:11:51 PM Study 3 dd Study 3
11/22/2005 4:09:58 PM Study 2 1312123 Study 2
11/22/2005 4:07:23 PM Study 1 123 Study 1
Disk Space Used
New
Open
Edit
Import
Cancel

3 Position cursor over any part of the preferred patient file and click the left mouse button.

4 Click the button. The ***Patient Information*** screen will appear



Patient Information Screen

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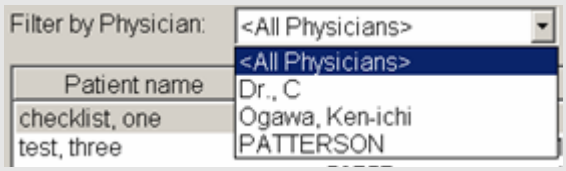
5 Make required changes or additions to patient file

- To enter a new study, select <new study>, enter Study Description (enter manually or use predefined study), Physician Information, and other pertinent data
- Position the cursor over each space where data is to be entered using the mouse or use the tab key or Enter key to move between entries and complete all necessary fields

6 When data entry is complete, click on one of the buttons at the bottom of the screen (Save, Open, Close).

Save	Use the SAVE button to add the patient data to the database. The ***Patient List*** screen reappears so additional patient files can be added.
Open	Use the OPEN button to save the patient data and open the patient file for acquisition. Patient information will be displayed on-screen.
Close	Use the CLOSE button to cancel this patient data. The patient data recently entered will not be saved. The ***Patient List*** screen will reappear.

NOTE:
Use Filter by Physician option to select patient for a specific doctor.



Click on down arrow to display list of physicians, highlight physician. The physician list is displayed alphabetically.

5.1.2.1. Patient Hierarchy

Patient images are organized by ***studies.*** A study might also be referred to as a folder and is further subdivided representing all of the images taken on one specific day or subsequent days. The *Precision RXi* offers the flexibility to set up studies to meet the physicians' specific requirements. Images can be added to an existing study or a new study can be created.

Each study contains another subdivision referred to as a ***series.*** Images within a series are taken in one imaging session. Once a patient session is closed, that series is also closed. When a new session begins, a new series is added. Within each series are ***sequences*** of images. Whether it has single or multiple images, each image loop is considered a sequence.

When a new patient file is set up, "Study 1" is automatically established and images acquired are assigned to "Series 1" and then sequences 1,2,3 etc. You can also select a study description from a list of predefined study descriptions when setting up a new patient or editing existing patient data.

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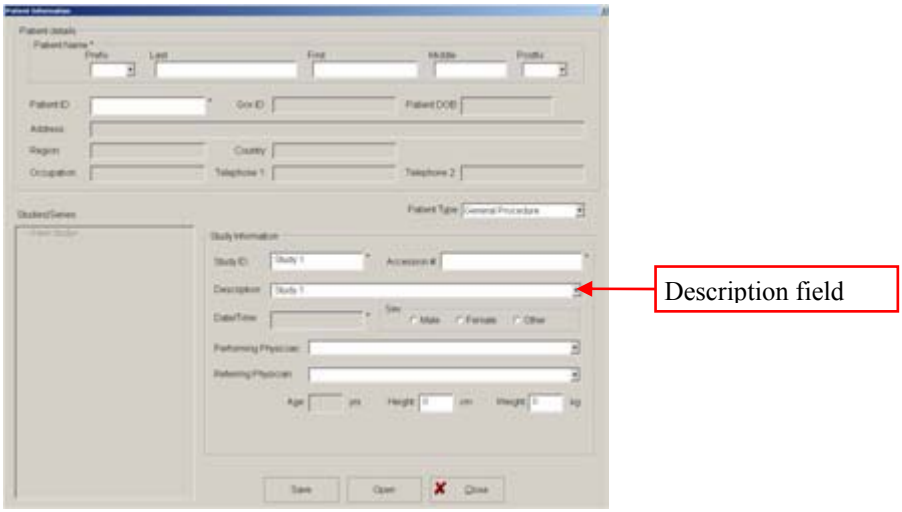
5.1.2.2. Studies

Predefined Study List: Quickly select from a list of predefined study descriptions.

From the Patient Information screen:

1 Click on the down arrow in the Description field under Study Information.



2 Use Description field in the Study Information box to name the first study.

3 Enter a title manually or click on the down arrow to view list of predefined study titles. If no description is selected, the default description is "Study 1" (or Study 2, 3 or 4…). Up to ten custom descriptions can be added. Once the maximum is reached, the system will replace the oldest entry with the new one

NOTE:
Once a description is entered manually, it is added to the list of those predefined and can be used in the future for similar types of studies

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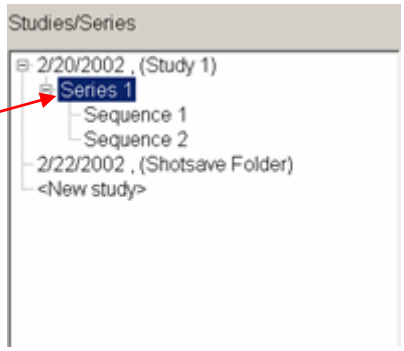
Series

Series:
When editing a patient study, each new session adds a new series.

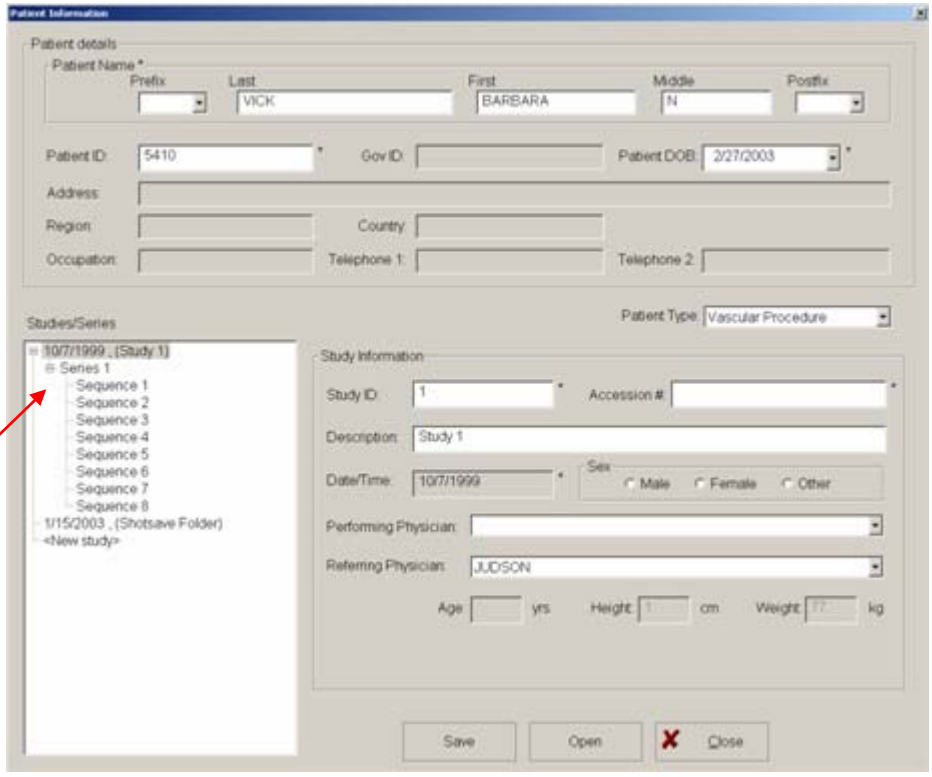


The computer automatically assigns the Series number but changes can be made to Series Information by using the ***Series Information*** screen.

To access ***Series Information*** screen:

1 Select Patient name from ***Patient List*** screen and click the Edit button. The patient information screen will be displayed.

Series:
Edit Study/Sequence information from this screen.



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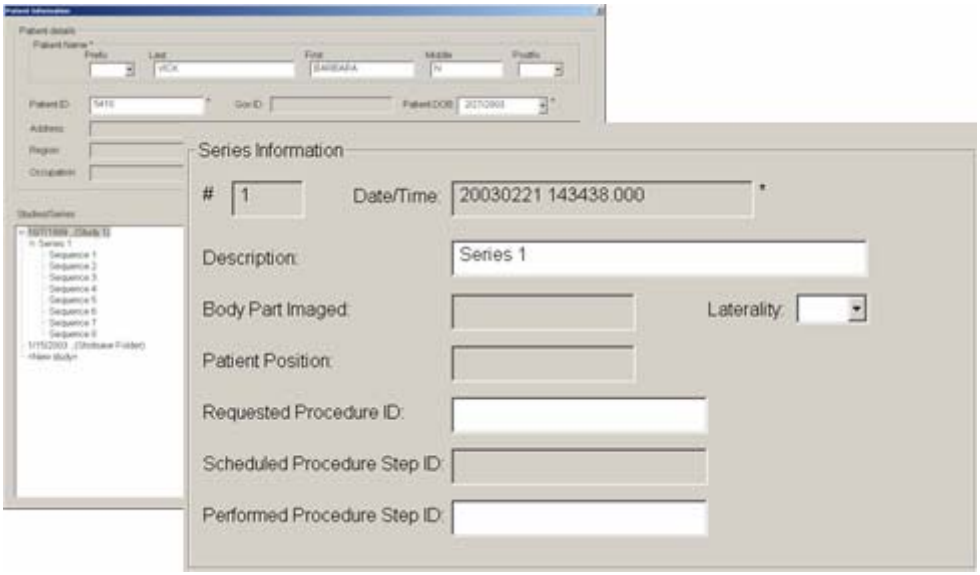
2 Position the cursor over Series to be edited and left click once to highlight. The Study Information screen will be replaced by the Series Information screen.



Series Information Screen

3 Enter information and then click the Save button at the bottom of the Patient Information screen.

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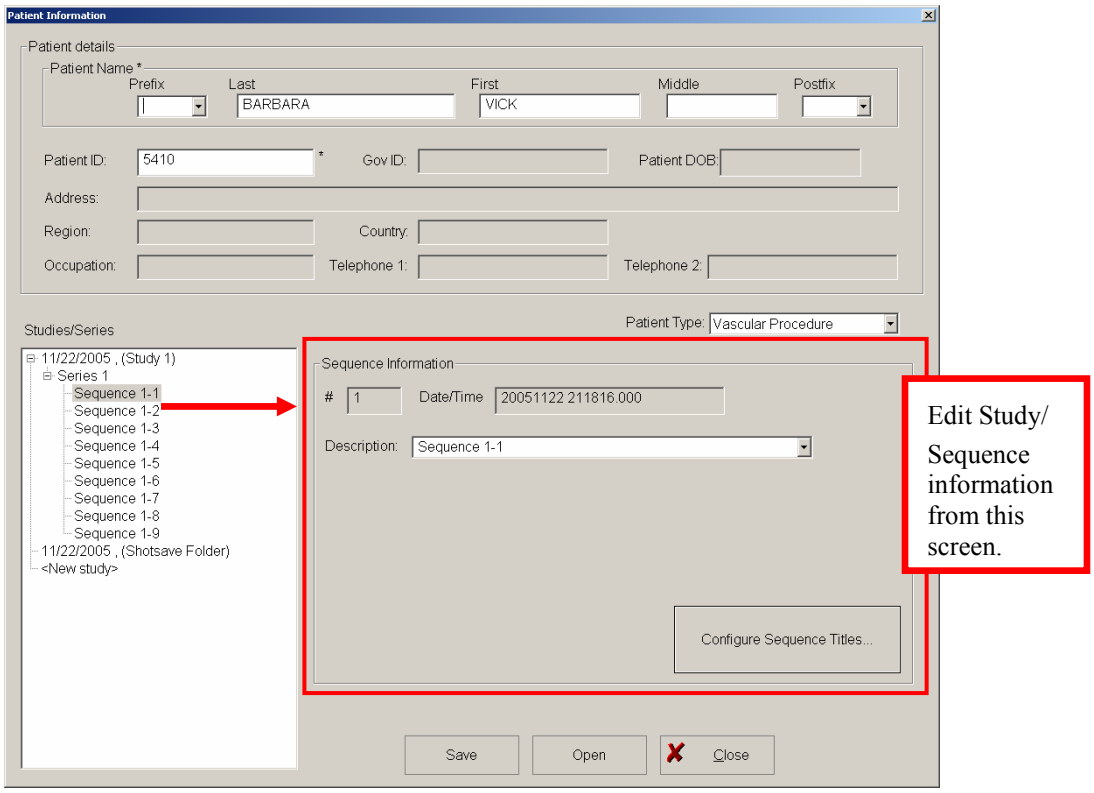
Sequence information

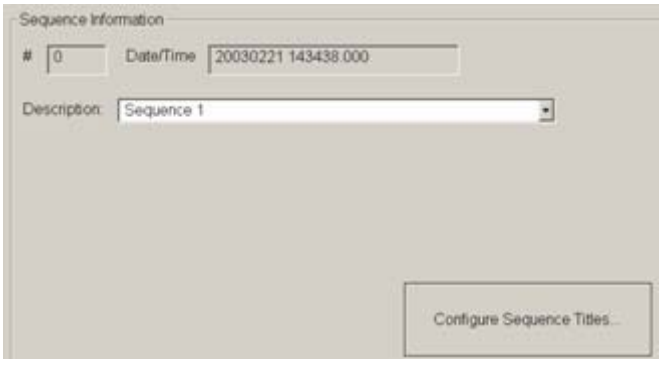
The Sequence Information screen will display the date and time the sequence was created. It can also be used to add sequencer titles to a list of those predefined for future use.

To access the *Sequence Information* screen

1 Select Patient name from ***Patient List*** screen and click the Edit button. The patient information screen will be displayed.



2 Position cursor over Sequence to be edited and left click once to highlight. The Study Information screen will be replaced by the Sequence Information screen.



Use the Sequence Information screen to Review Date and Time.

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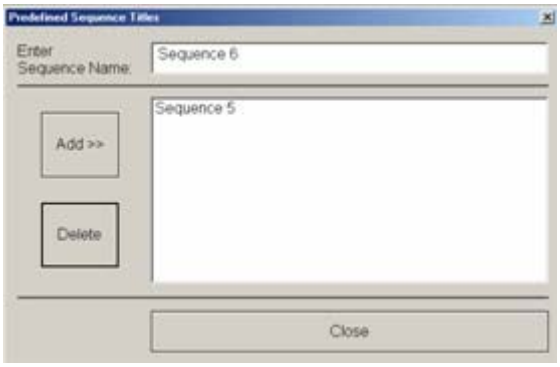
To Configure Sequence Titles

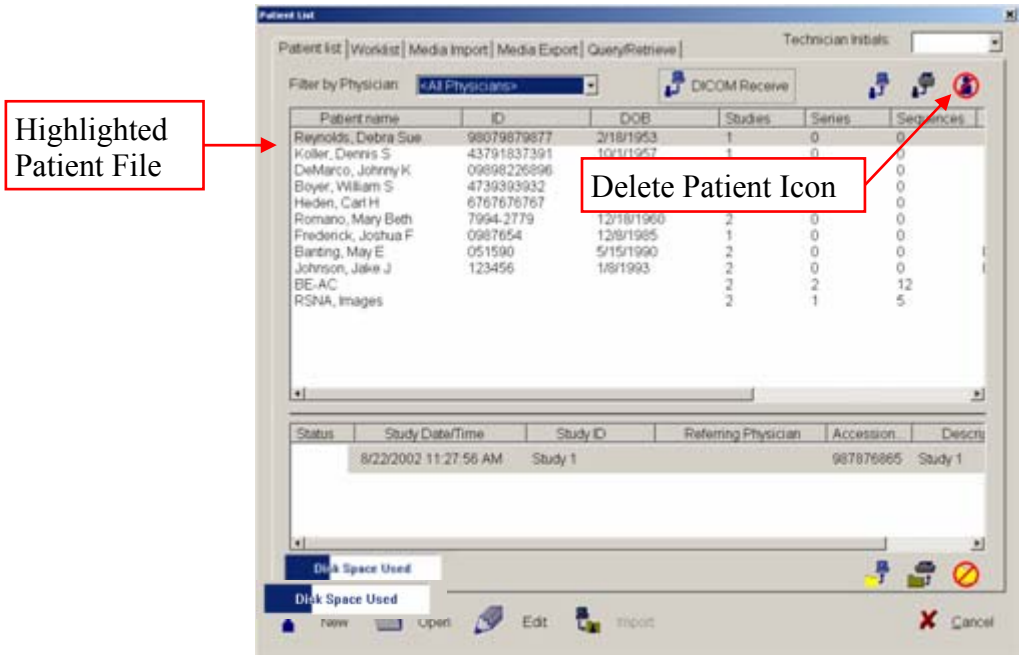
1 Click on Configure Sequence Titles... . The Predefine Sequence Titles screen will be displayed.
2 Add or delete sequence title to predefined list as needed and then click Close .



Refer to next section (Acquiring Images) for instructions on Programmable sequences. Additional information on working with sequences - Sequence Title Edit, Sequence Selection, Sequence Replay, etc.- is provided in Section Reviewing Images.

5.1.2.3. Delete patient file

1 From the *Main Image* screen, click on *Patient List* button.
2 The *Patient List* screen will appear.



3 Highlight patient file to be deleted. To delete more than one patient, hold down the "Ctrl" key on the lower left of the keyboard and single left click on each patient file to be deleted.
4 When selection(s) are made, click the delete button in the top right portion of the ***Patient List*** screen.

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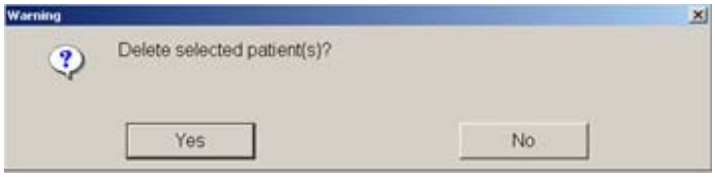
5 If the Warning option is configured in the Service Application, a warning will be displayed asking for confirmation of this action.



6 Select <Yes> and the patient file(s) will be deleted – Select <No> and the ***Patient List*** will once again be displayed.

7 To Delete an Opening Patient, a Warning will appear indicating the Patient is Locked and cannot be Deleted.

5.1.2.4. Delete Images

An image can be deleted when a patient file is open and the image to be deleted is visible on the screen.

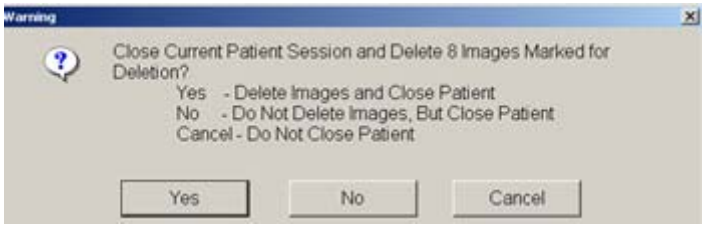
***NOTE**:*
For Multiple Image Display, the preferred image must be selected with the cursor box as well.

1 Select the **Delete Frame** button . The text notation, "**D"** will appear in the bottom right portion of the screen, above the Window & Level settings in the Main Image Display Area. For Multiple Image Display, a "D" will appear in the bottom left portion of the screen.

2 Repeat step 1 to mark additional images for deletion.

3 When the patient file is closed, a warning will appear detailing the number of images marked for deletion.

- Select Yes to delete the marked sequences and close the patient file.
- Select No to close the patient file without deleting any images.
- Select CANCEL to cancel request to close the patient file (no images will be deleted).


Warning
Close Current Patient Session and Delete 8 Images Marked for Deletion?
Yes - Delete Images and Close Patient
No - Do Not Delete Images, But Close Patient
Cancel - Do Not Close Patient
Yes
No
Cancel

***CAUTION**:*
Once the patient file is closed and the images deleted, there is no way to restore the images (unless the images were stored elsewhere).

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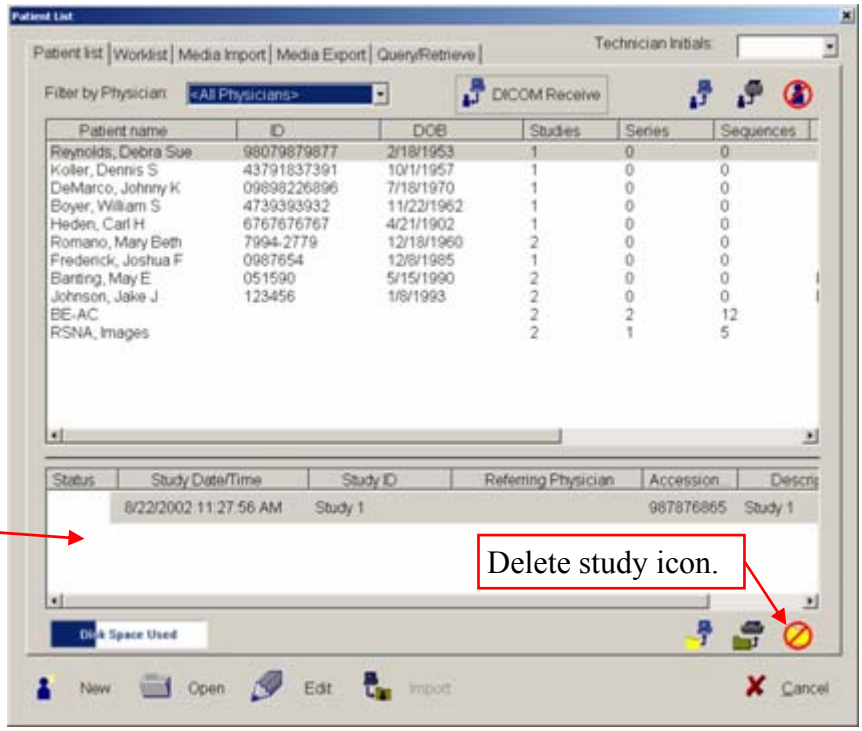
5.1.2.5. Delete Patient Study

A patient study can be deleted while leaving the patient data and remaining studies intact.

1 From the *Main Image* screen, click on **Patient List** button.

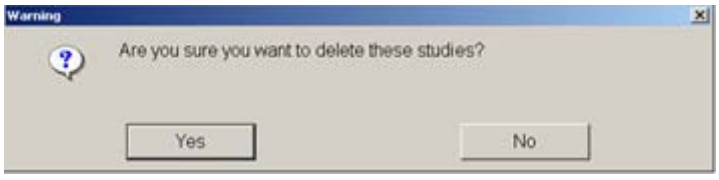
2 The *Patient List* screen will appear.


Patient List
Patient list | Worklist | Media Import | Media Export | Query/Retrieve
Technician Initials:
Filter by Physician:
<All Physicians>
DICOM Receive
Patient name | ID | DOB | Studies | Series | Sequences
Reynolds, Debra Sue 98079879877 2/18/1953 1 0 0
Koller, Dennis S 43791837391 10/1/1957 1 0 0
DeMarco, Johnny K 09898226896 7/18/1970 1 0 0
Boyer, William S 4739393932 11/22/1962 1 0 0
Heden, Carl H 6767676767 4/21/1902 1 0 0
Romano, Mary Beth 7994-2779 12/18/1960 2 0 0
Frederick, Joshua F 0987654 12/8/1985 1 0 0
Banting, May E 051590 5/15/1990 2 0 0
Johnson, Jake J 123456 1/8/1993 2 0 0
BE-AC 2 2 12
RSNA, Images 2 1 5
Status | Study Date/Time | Study ID | Referring Physician | Accession | Descrip
8/22/2002 11:27:56 AM Study 1 987876865 Study 1
Highlighted study.
Delete study icon.
Disk Space Used
New
Open
Edit
Import
Cancel

3 Highlight patient ***study*** to be deleted. To delete more than one study, hold down both the "Ctrl" and "Alt" keys on the lower left of the keyboard and single left click on each study to be deleted.

4 Click the ***delete study*** button in the lower right portion of the Patient List screen.

5 If the Warning option is configured in the Service Application, a warning will be displayed asking for confirmation of this action.



6 Select <Yes> and the studies(s) will be deleted – Select <No> and the ***Patient List*** will once again be displayed.

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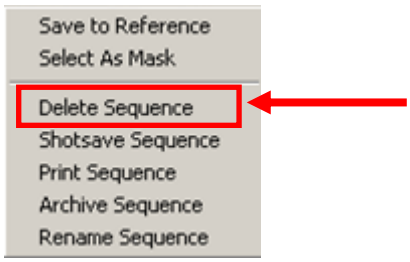
5.1.2.6. Delete a Sequence of Images

- A "Sequence of Images" is a series of images within a study.
- Each sequence of images is shown as a Thumbnail on the Main Image screen.
- Each sequence of images is numbered automatically as it is acquired.
- When a sequence is deleted from a study, the original numbers for the remaining sequences will be retained.

Example of Sequence Numbering:
If a Study originally included Sequences 1:1, 1:2, 1:3, 1:4, 1:5, 1:6 and Sequence 1:3 is deleted; the remaining Sequences will retain their original numbers and Sequence 1:3 will no longer appear in list.

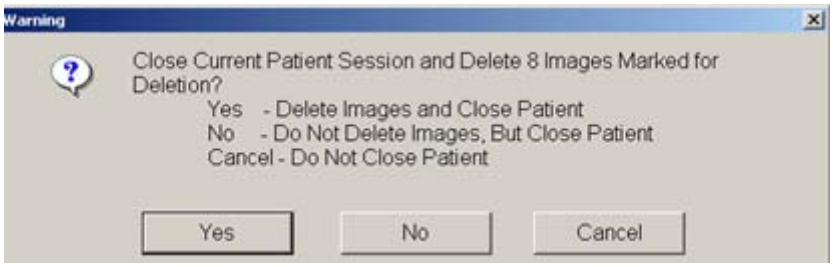
Original Sequence Numbering	Deleted Sequence Number	New Sequence Numbering
1:1, 1:2, 1:3, 1:4, 1:5, 1:6	**Delete Sequence 1:3**	**1:1, 1:2, 1:4, 1:5, 1:6**

1 Open the preferred patient file and select the Thumbnail button if not already active to display the sequence thumbnails.
2 Position cursor over the thumbnail representing the sequence to be deleted, and right click.
3 From the Right-click menu, select the Delete Sequence option.



4 A "D" will mark the sequence for deletion in the upper right corner of the Thumbnail image, and the right-click menu will close.
5 Repeat these steps to mark other sequences for deletion.
6 When the patient file is closed, a warning will appear detailing the number of images marked for deletion.

- Select Yes to delete the marked sequences and close the patient file.
- Select No to close the patient file without deleting any images.
- Select CANCEL to cancel request to close the patient file (no images will be deleted).


Warning
Close Current Patient Session and Delete 8 Images Marked for Deletion?
Yes - Delete Images and Close Patient
No - Do Not Delete Images, But Close Patient
Cancel - Do Not Close Patient
Yes
No
Cancel

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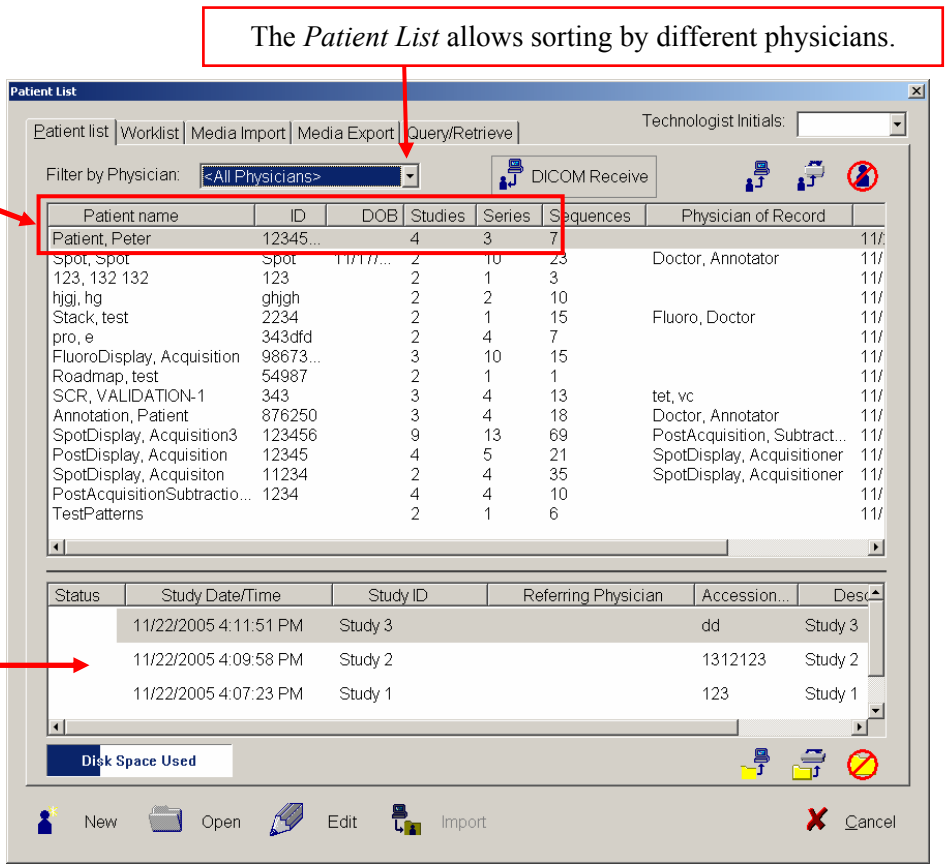
5.1.2.7. Sorting the Patient List

The *Patient List* can be sorted by *Patient Name, ID, DOB, Physician of Record or Study Date*. To sort the patients by a specific field, click on the *Column's Title*.



1 In the Patient Information Area, the Patient List allows sorting by Patient Name, ID, DOB, Physician of Record or Study Date. To sort the database by a specific field, click on the Column's Title.

2 In the Study Information Area, the Patient List allows sorting by Study ID, Study Date/Time, Referring Physician and Description. To sort the database by specific field, click on the Column's Title.

5.1.3. Customizing the *Patient List* Screen

The ***Patient List*** screen is configured so that nine different columns of pertinent information can be displayed – ID, DOB, Studies, Series, Sequences, Physician of Record, Study Date, Sex, and Total Images. However, columns can be easily removed from the display if they are not needed.

Position the cursor over the header bar and right click. A sub-menu will be displayed, and a check mark will appear next to the title of each header currently displayed on the screen. To eliminate that column from the screen, left click on the check mark. That column will be eliminated from the display, but can be added back by reversing this procedure and putting a check mark next to its title.

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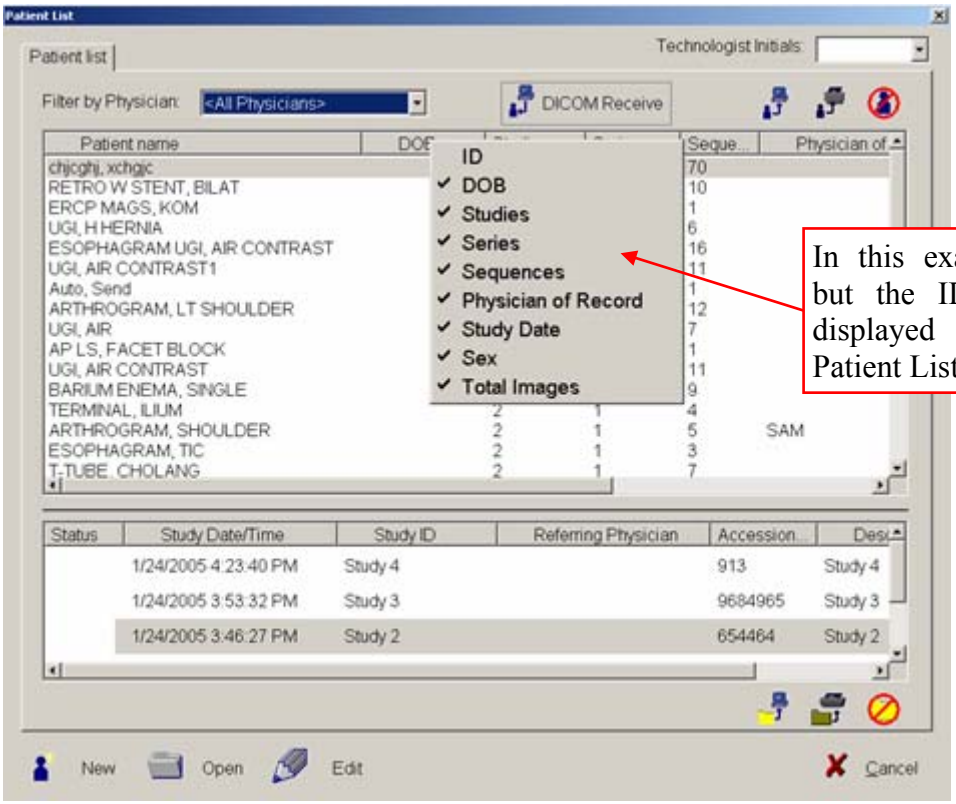

In this example, all but the ID data is displayed on the Patient List screen.

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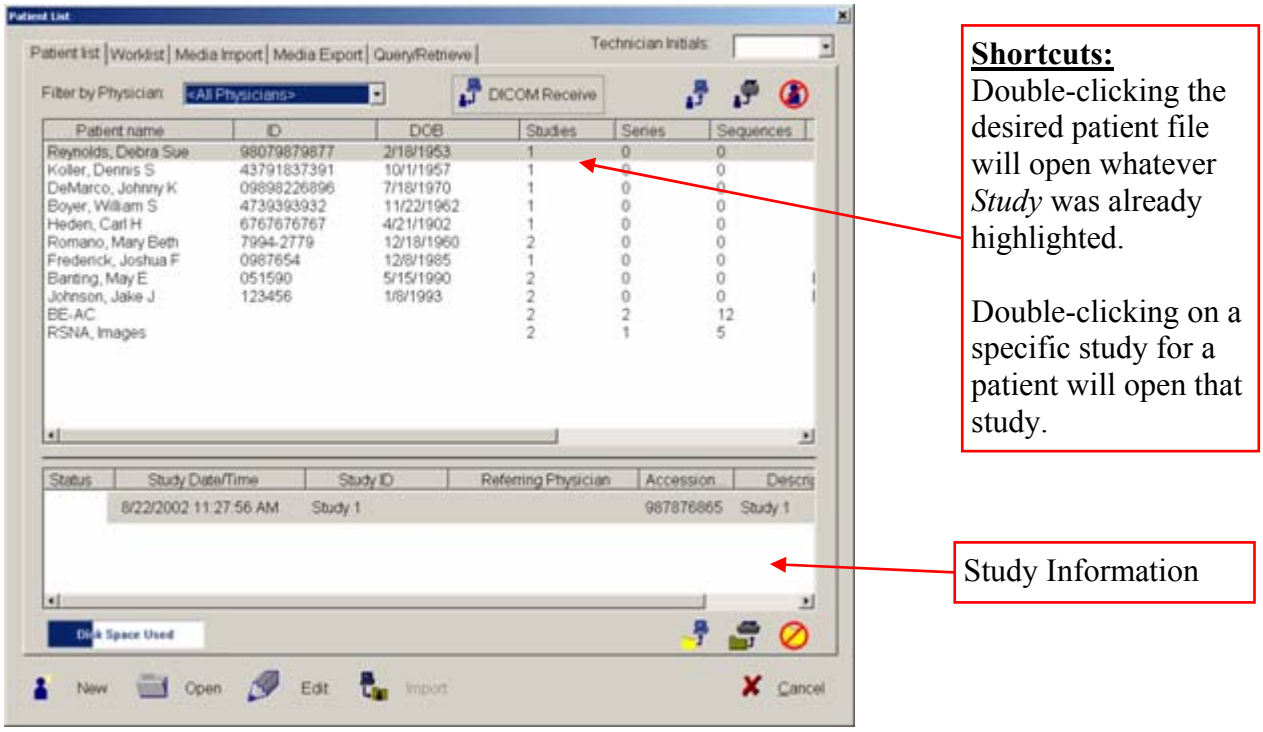
5.1.4. Open Existing Patient File

1 From the *Main Image* screen, click on **Patient List** button.
2 The *Patient List* screen will appear (see below). Position cursor over any part of the preferred patient file and click the left mouse button.
3 Highlight the Study you desire to Open.
4 Click the **OPEN** button. The system will open the patient file and selected study.

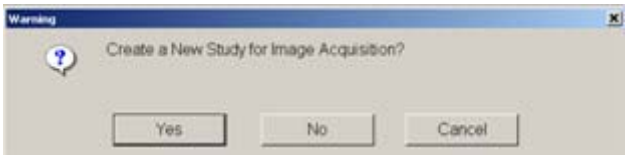


Patient List Screen

5 To acquire images for this patient file select the Acquire button from the *Main Image* screen.
6 To Review images refer to Chapter 7 of this manual for more information on the *Review* Functions.

CAUTION:
When adding images to a patient file, verify that the correct patient has been selected by comparing all of the patient information. Patient data is shown at the Patient List and in the lower menu portion on the Main Image screen.

7 A prompt will appear - use the instructions that follow to either add images to the current study or start a new study.



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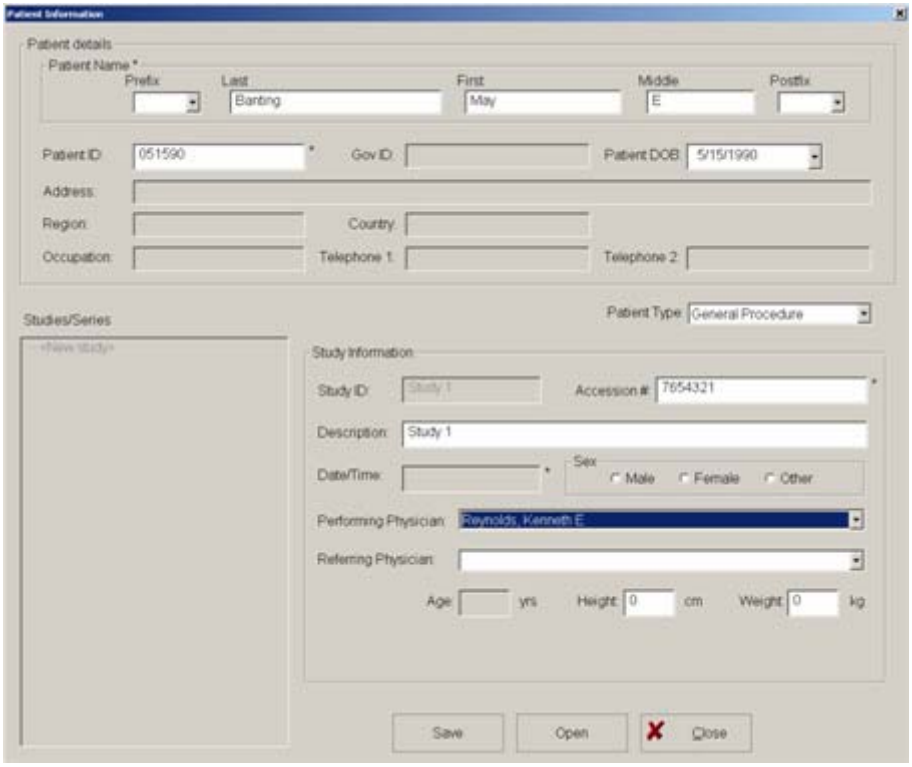
5.1.4.1. Acquire/Add New Images to Current Study

1 Select **NO** at the prompt. The screen will return to *Main Image* screen.
2 Select preferred acquisition rate from the **Rate**. The next acquired image will be added in the next available thumbnail slot for this study.
3 See Chapter 6 of this manual for more information on the *Acquire* functions and features.

5.1.4.2. Acquire/Add New Images - Create New Study

1 Select **YES** at the prompt.
2 The ***Patient Information*** screen will open. Click on <*New study*>.



Patient Information Screen

3 Fill in the new information for the study (right side of the screen).
4 Click Open.
5 See Chapter 6 of this manual for more information on the *Acquire* functions and features.

5.1.5. Import Patient Data Using DICOM WorkList Feature

Use the *WorkList* feature to search a database (usually a centralized database connected via a DICOM network) for patients based on specific criteria. Look for groups of patients, or a specific patient file. This feature is used to search by Patient Data only - not images.

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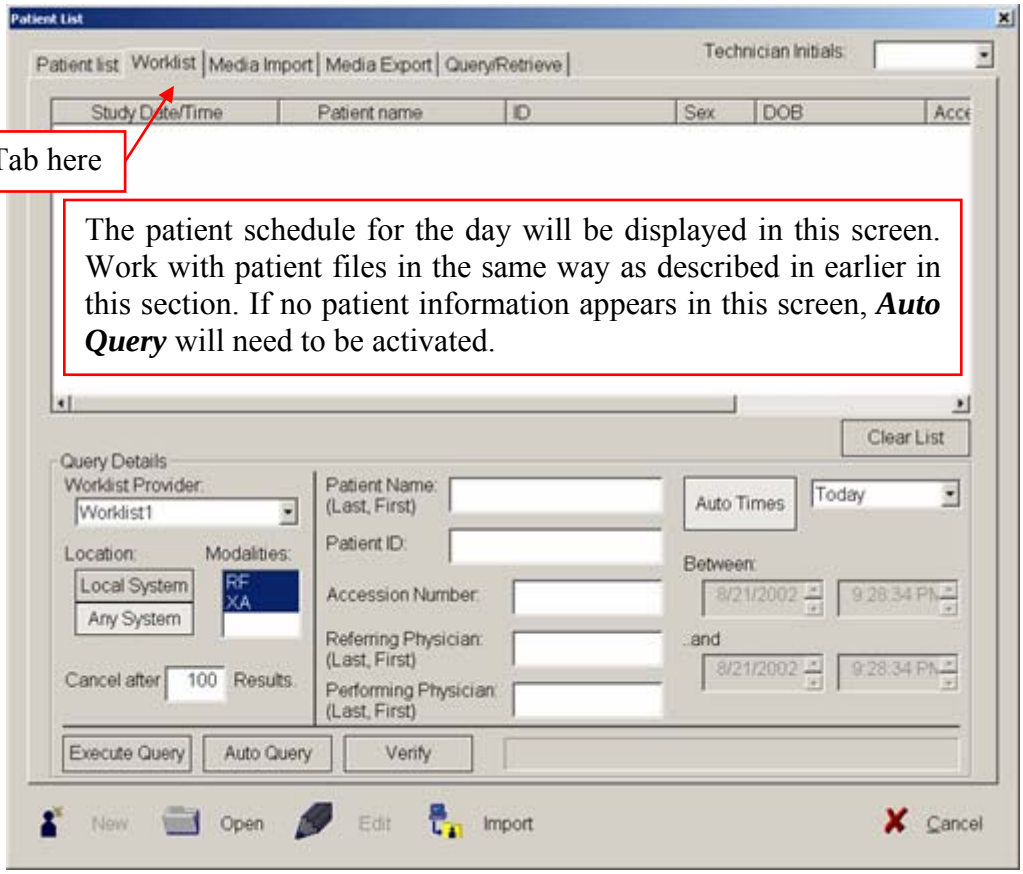
5.1.5.1. Accessing Worklist

1 From the ***Main Image*** screen, click on the **Patient List** button.
2 Select the **Worklist** tab. The ***Worklist*** screen will be displayed.



Worklist Screen

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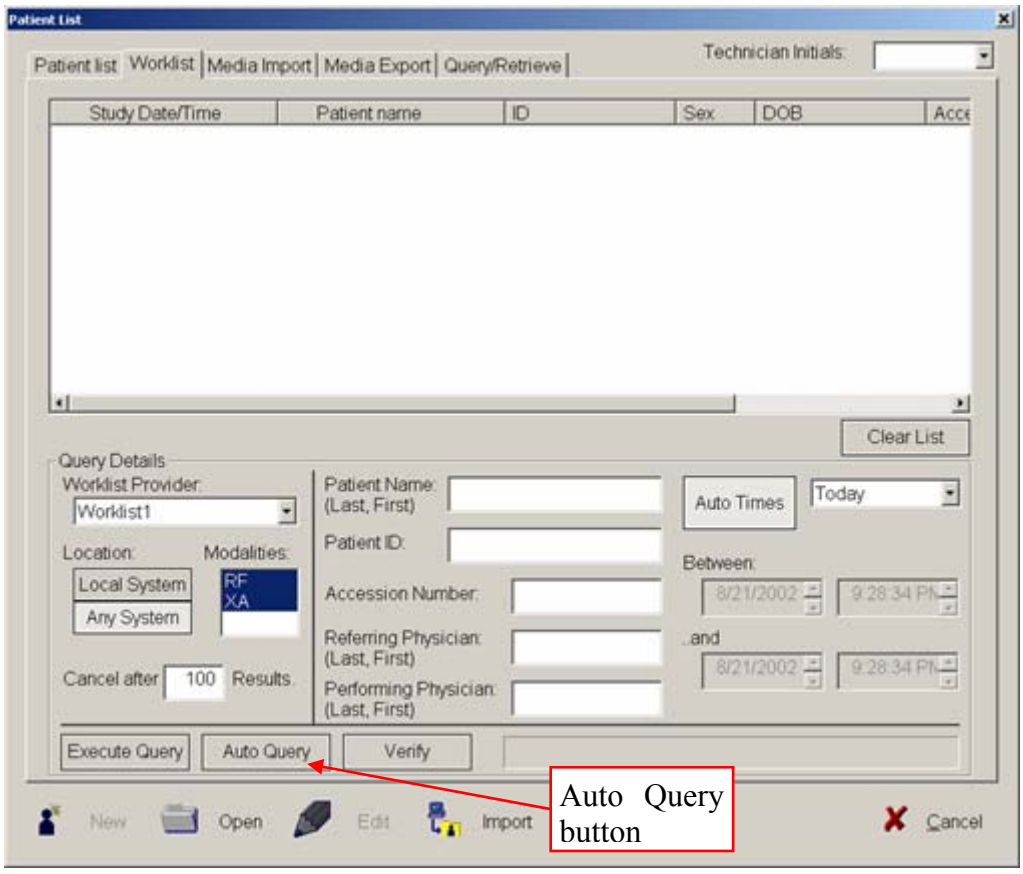
5.1.5.2. Setup Automatic Query to Search for Patient Files

Auto Query can be used to search for Patient files from either the local system or any system that is linked to a DICOM network. The Worklist will contain all patients scheduled for the time period specified in the search.



1 From the ***Worklist*** screen, select the Auto Query button.
2 The Auto Worklist screen will be displayed.

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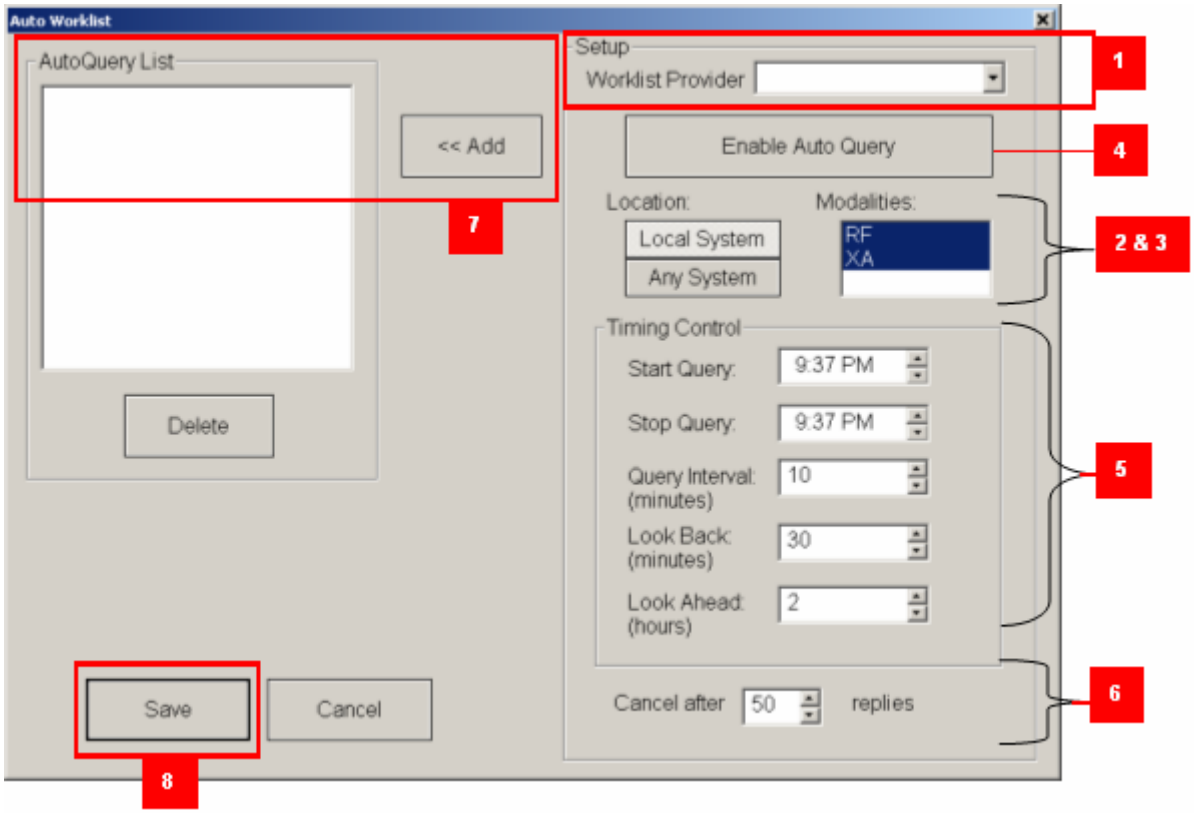
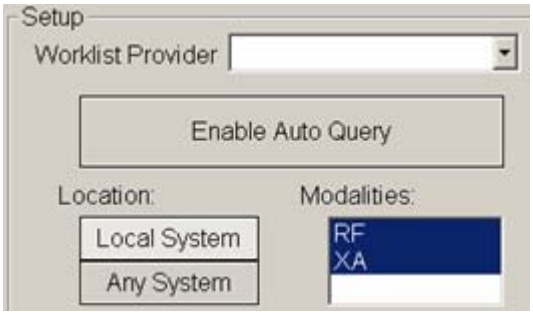


Auto Worklist Screen

Setting Up a Query:

Follow the above sequence **(Steps 1 through 8)** for *Query Set-up.*

Note: ***Steps 9 and 10 are used after a Query has Run.***



1 Select a database to search (called – *Provider*).

2 Select Location: Any System

Local System	Specific room
Any System	Searches DICOM network

3 Select Modality to be Queried:

RF	Radio Fluoroscopy (returns only files that contain the RF Modality)
XA	Angiographies (returns only files that contain the XA Modality)

4 Click the

button.

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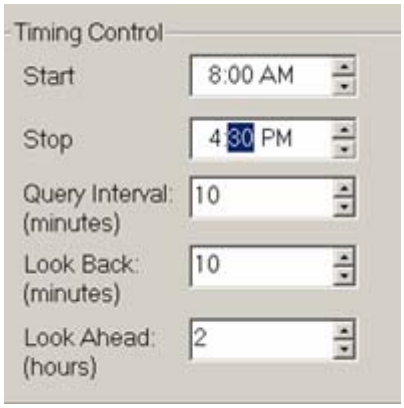
5 Set the Time Parameters for running Automatic Queries.

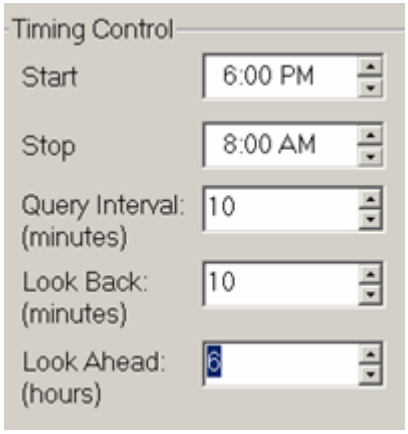
Entering Timing Parameters:



Example A

To set the system to Automatically Query the Worklist database for patients scheduled within the next two hours, and to have this Query Run only during business hours, select the following:

Start Query:	8:00 am
Stop Query:	4:30 pm
Query Interval:	10 minutes
Look Back:	10 minutes
Look Ahead:	2 hours



Example B

To Run Automated Queries during the night for patients scheduled for procedures the next morning, select the following:

Start Query:	6:00 pm
Stop Query:	8:00 am
Query Interval:	10 minutes
Look Back:	10 minutes
Look Ahead:	6 hours

NOTE: The Add button updates the Auto Query List by adding the Query Name to the list of saved queries and saving its Time Parameters. You MUST press the SAVE button to save the Query's Time Parameters.

6 Select maximum number of results to be returned for the Query. Range is 1-500.

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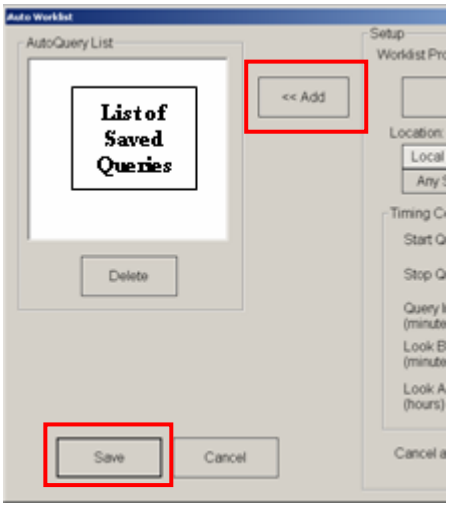
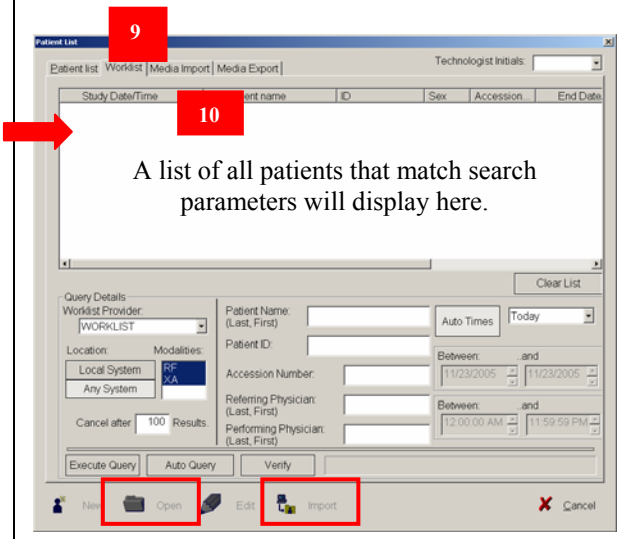


7 Select the << Add button to add Query to the list.

8 Select the Save button to set the Query. It will begin depending on the time parameters set above.

NOTE: The ***Add*** button updates the *Auto Query List* by adding the *Query Name* to the list of saved queries. ***You MUST press the SAVE button to save the queries so it can be selected again from the Query List***; otherwise it will not be selectable again from this list.



9 After the *Query* has Run, the results will display on the *Worklist Results Screen.*

10 Highlight the *Preferred Patient* and then click on the Open button.

- The Patient Information will be imported into the local database, the patient added to the Patient List, and the Patient File will be opened with Acquisition Enabled.
- If the Import button is selected instead of the Open button, the Patient File Data will be imported into the database but you will not automatically be brought to the Acquisition screen.
- The Worklist Results information remains on the Worklist screen until the Current Session is closed, or until the Clear List button is selected.

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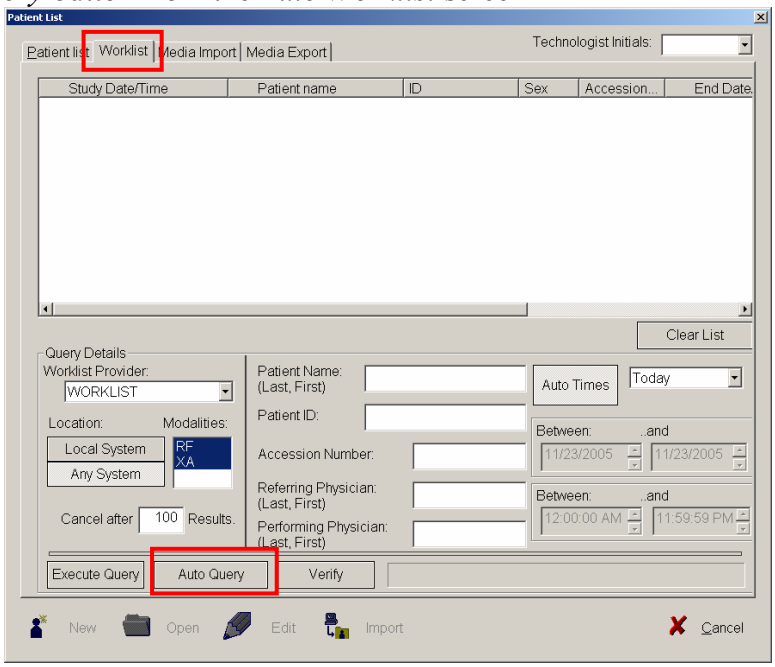
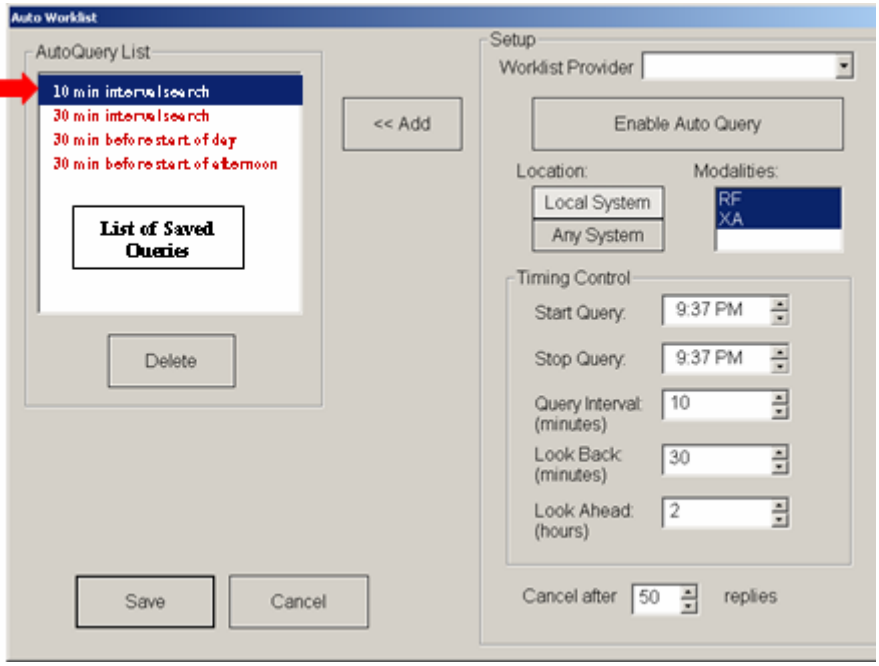
5.1.5.3. Editing an Existing Query on the Auto Query List

1 Select the Auto Query button from the *Patient List screen – Worklist Tab* to display the *Auto Worklist* screen.

2 Click the *Query* button from the *Auto Worklist* screen



3 Select a previously saved *Query* from the *Auto Query List* that requires editing.



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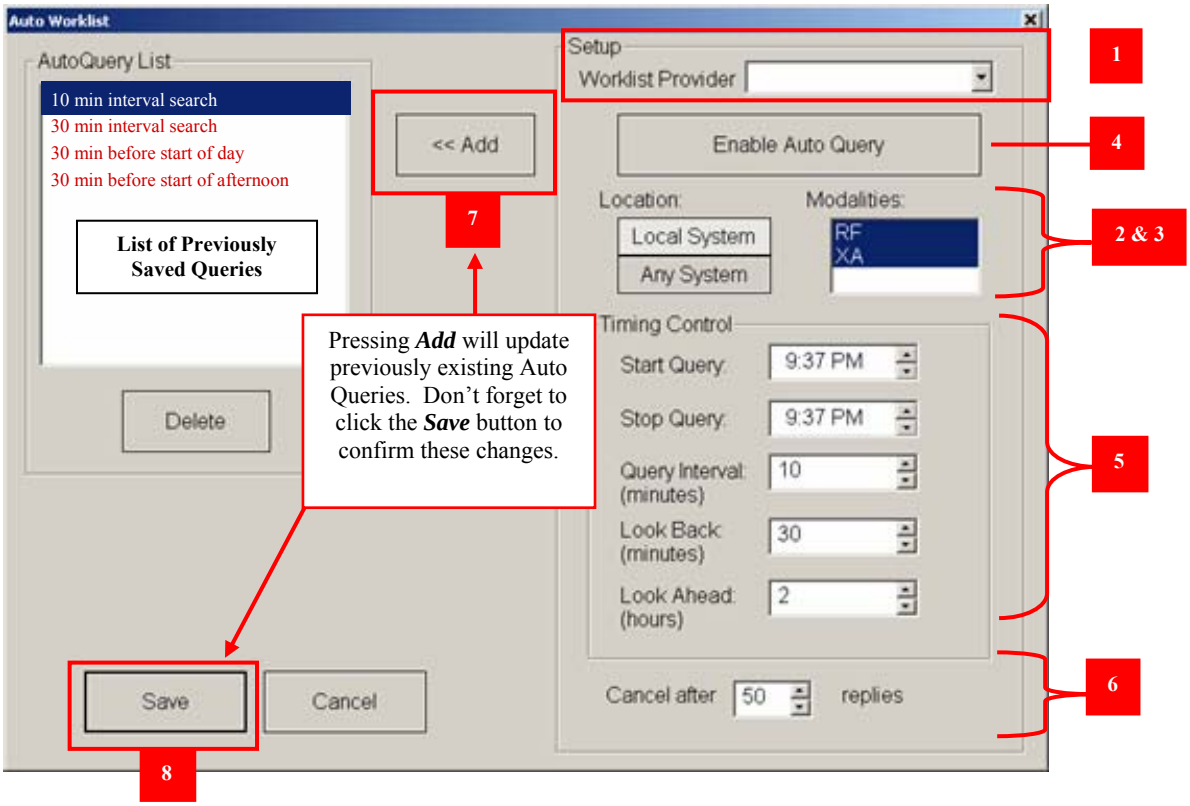
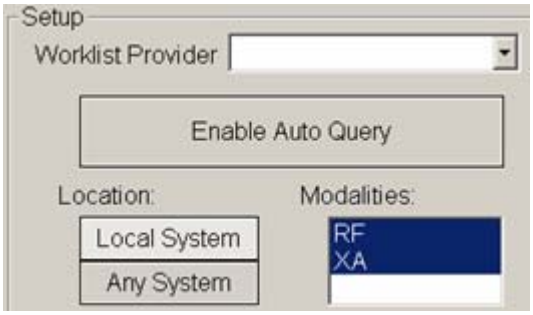
4 Then, complete all the steps in the Automatic Query Setup Procedure (Steps 1-8 on the Auto Worklist screen).



Follow the above sequence **(Steps 1 through 8)** for *Query Set-up.*

Note: ***Steps 9 and 10 are used after a Query has Run.***



1 Select a database to search (called – *Provider*).

2 Select Location: Any System

Local System	Specific room
Any System	Searches DICOM network

3 Select Modality to be Queried:

RF	Radio Fluoroscopy (returns only files that contain the RF Modality)
XA	Angiographies (returns only files that contain the XA Modality)

4 Click the button.

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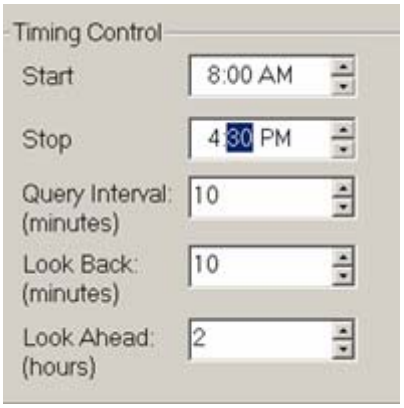
5 Set the *Time Parameters* for running *Automatic Queries*.

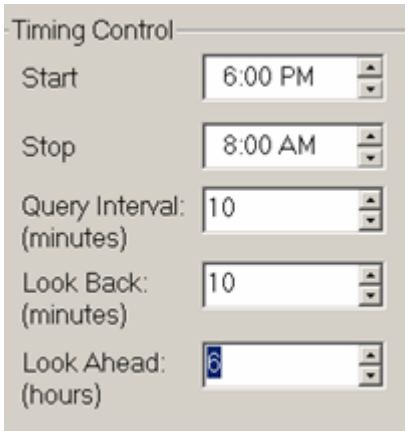
Entering Timing Parameters:



Example A

To set the system to Automatically Query the Worklist database for patients scheduled within the next two hours, and to have this Query Run only during business hours, select the following:

Start Query:	8:00 am
Stop Query:	4:30 pm
Query Interval:	10 minutes
Look Back:	10 minutes
Look Ahead:	2 hours



Example B

To Run Automated Queries during the night for patients scheduled for procedures the next morning, select the following:

Start Query:	6:00 pm
Stop Query:	8:00 am
Query Interval:	10 minutes
Look Back:	10 minutes
Look Ahead:	6 hours

NOTE: The Add button updates the Auto Query List by adding the Query Name to the list of saved queries and saving its Time Parameters. You MUST press the SAVE button to save the Query's Time Parameters.

6 Select maximum number of results to be returned for the Query. Range is 1-500.

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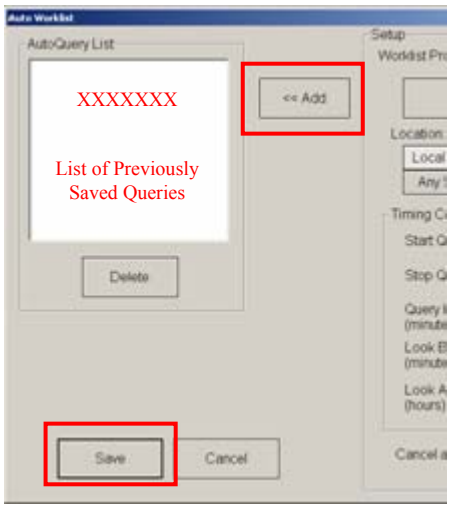
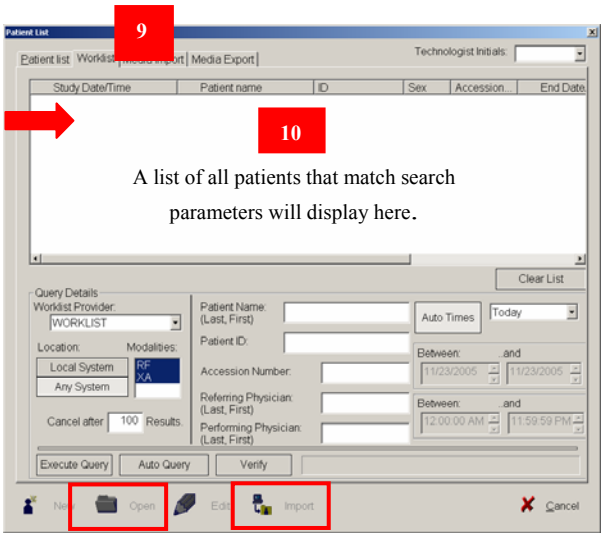


7 Select the << Add button to add *Query* to the list.

8 Select the Save button to set the *Query*. It will begin depending on the time parameters set above.

NOTE: The ***Add*** button updates the Auto Query List by adding the *Query Name* to the list of saved queries. ***You MUST press the SAVE button to save the Query's Time Parameters;*** **to enable it to be selected again from the query list**.



9 After the Query has Run, the results will display on the Worklist Results Screen.

10 Highlight the *Preferred Patient* and then click on the Open button.

- The Patient Information will be imported into the local database, the patient added to the Patient List, and the Patient File will be opened with Acquisition Enabled.

- If the Import button is selected instead of the Open button, the Patient File Data will be imported into the database but you will not automatically be brought to the Acquisition screen.

- The Worklist Results information remains on the Worklist screen until the Current Session is closed, or until the Clear List button is selected.

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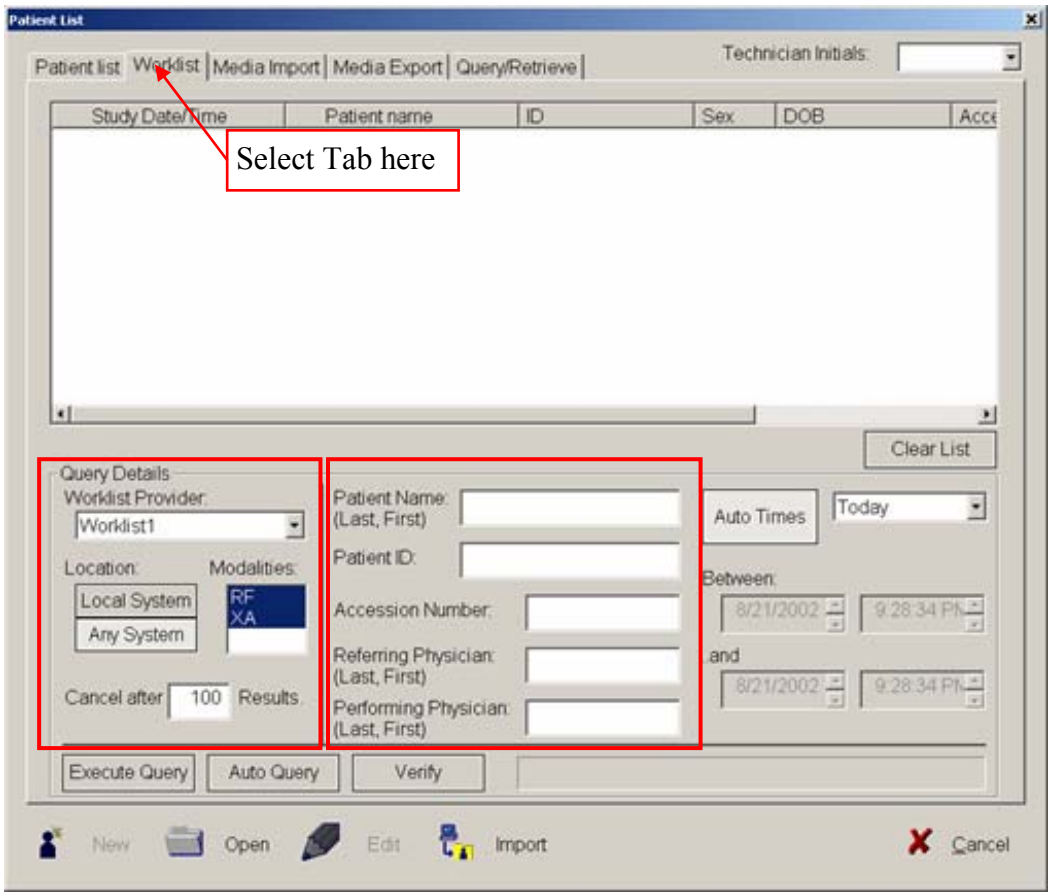
5.1.5.4. Manual Search for a Specific Patient File



Worklist Screen

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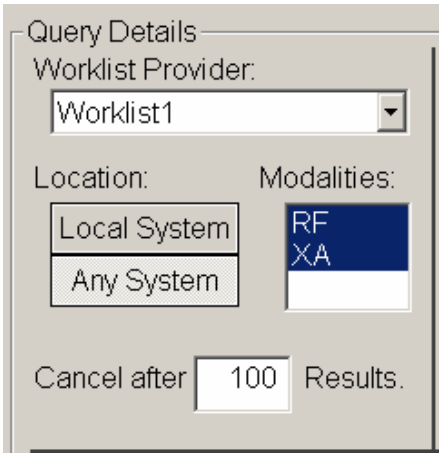


1 Select a database to search (called – *Provider*).

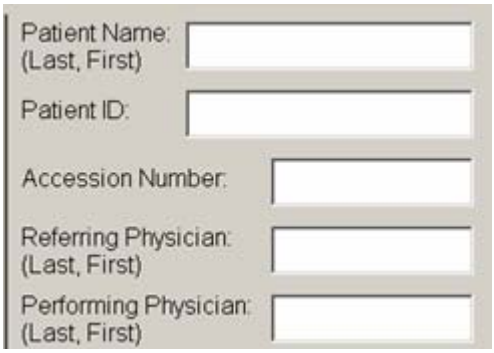
2 Select Location:

Local System	Specific room
Any System	Searches DICOM network

3 Select Modality to be Queried:

RF	Radio Fluoroscopy (returns only files that contain the RF Modality)
XA	Angiographies (returns only files that contain the XA Modality)

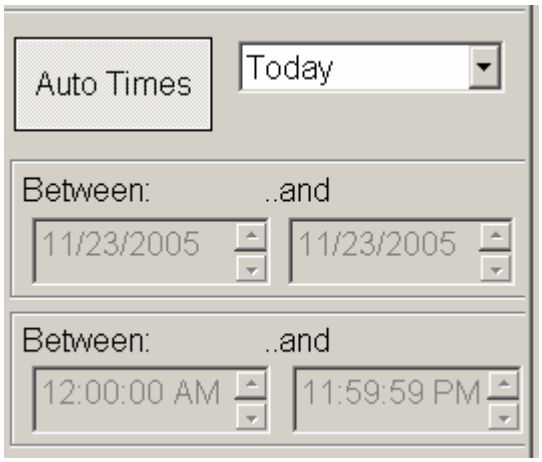
4 Select maximum number of results to be returned for the query. Range is from 1-999.



5 Enter data for which you want to search.

Examples: To import a patient with the name Jim Smith, type "*Smith, Jim"* in the **Patient Name** field.

To import all patients from a referring Physician named Dr. Jones, type "*Dr. Jones"* in the **Referring Physician** field.



Date and Time
Patients can be searched for by scheduled exam time. Auto Time can be used to search for "Today", "Today AM" , "Today PM", or "Tomorrow."

Disabling Auto Times…
… enables the "Between.." and the "and" fields where the Date Range can be set…
… and the Time Interval for each day that will be searched.

6 Before trying to run the actual *Query*, verify that the selected database system is functioning. Select the Verify button. The system will show the status in the lower right of screen.

7 If the database is functioning, click on the Execute Query button to run the Query.

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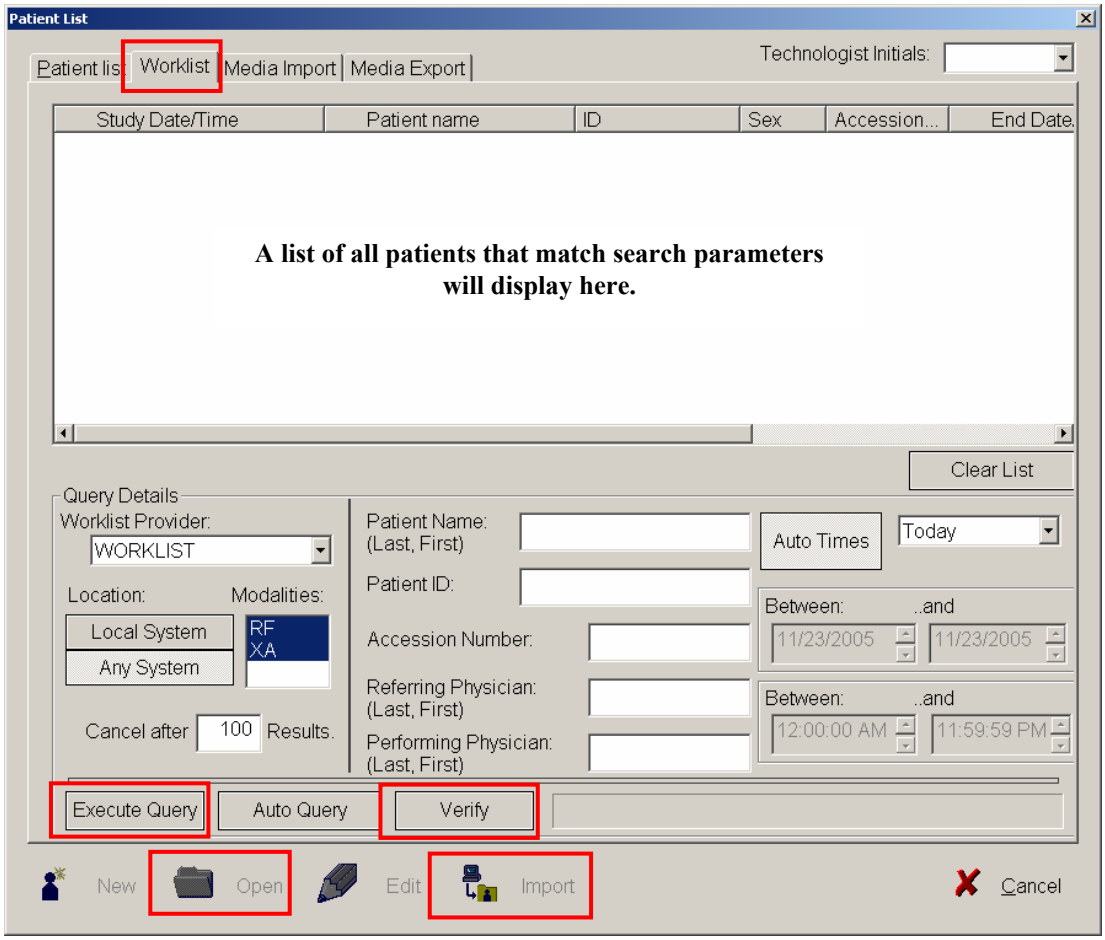

8 Highlight the preferred patient and then click on the button.

- The patient information will be imported into the local database, the patient added to the Patient List, and the patient file will be opened with acquisition enabled.

- If the button is selected instead of the Open button, the patient file data will be imported into the database but you will not automatically be brought to the Acquisition screen.

- The Worklist Results information remains on the Worklist screen until the current session closed.

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5.1.6. Close a Patient File

In order to open a new patient file, the current file must be closed - only one patient file can be open at a time. When a Patient File is open, the ***Main Image*** screen will display pertinent patient data in the upper left corner.

When a patient file is closed, that file will no longer be in use. Even images being transferred to another device are considered not in use. Transferring images are considered to be in the background, and the file is considered closed.

Common Methods for closing a patient file:

	Select the Patient List button. When a different patient file is selected, the current patient file will be closed. If images are marked for deletion, a prompt will be displayed asking for confirmation of the "close patient file request".
	Select the Close button. If images are marked for deletion, a prompt will be displayed asking for confirmation of the "close patient file request". If no patient file is open when the Close button is selected, the system will consider this a Shutdown request. The system will ask for confirmation of this request.

5.2. Set doctor preferences

This feature allows a site to define certain parameters for individual Doctors to further automate the image acquisition functionality. This feature is called *Doctor Preferences*.

Whenever a Physician is selected as the *Performing Physician* for a patient, the system will automatically use the preferred features and exact settings for image acquisition, Review, Printing, and Network Transfer.

In order for the feature to work the Doctor's preferences have to be programmed into the system. If no Preferences are entered, the DIS system will use default features and settings.

Refer to Chapter 6 "Acquiring Images" for complete description of each of the Doctor Preference settings.

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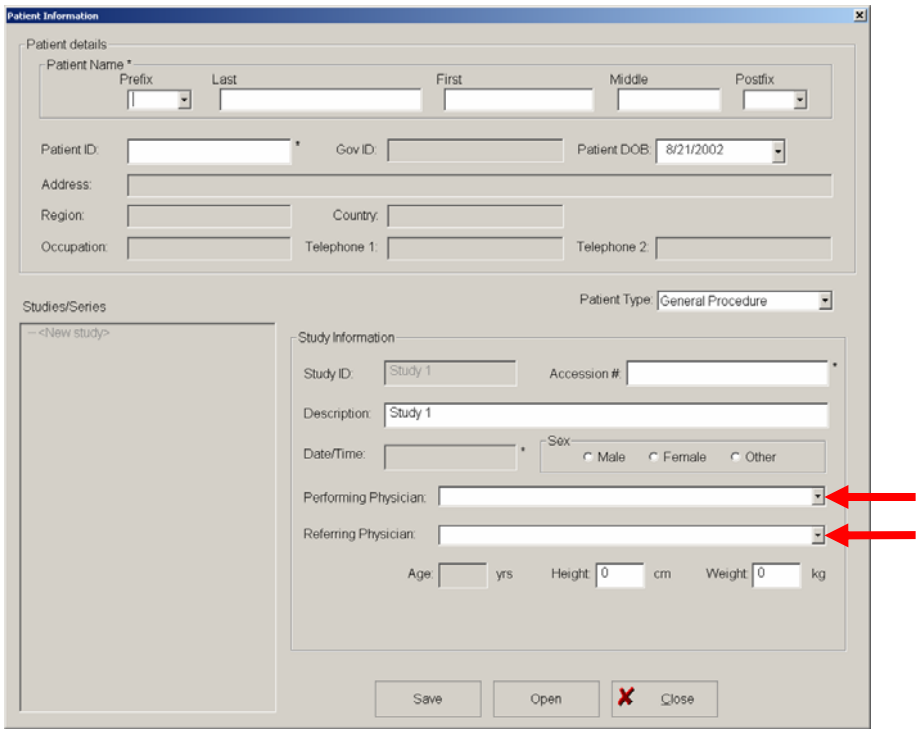
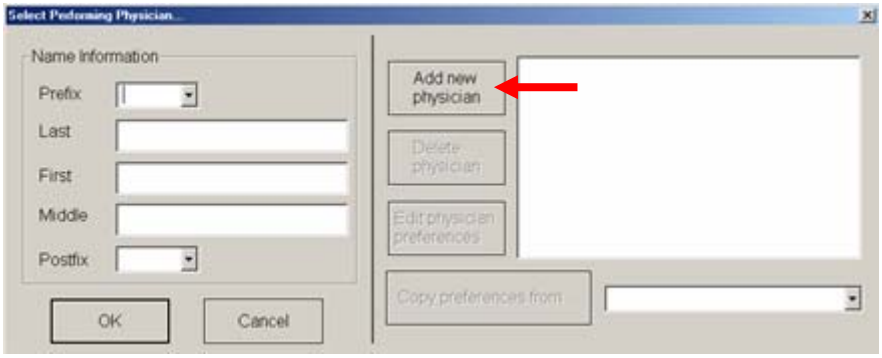
5.2.1. Add a new physicians

1 Select the Patient List button.
2 Select a new or existing patient file.
3 Click on Down arrow for either Performing or Referring Physician



The resulting menu will show all physicians currently established as well as a **<New Physician>** option.

4 Select the **<New Physician>** option.
5 The Physician Name Editor screen will open.



Physician Name Editor Screen

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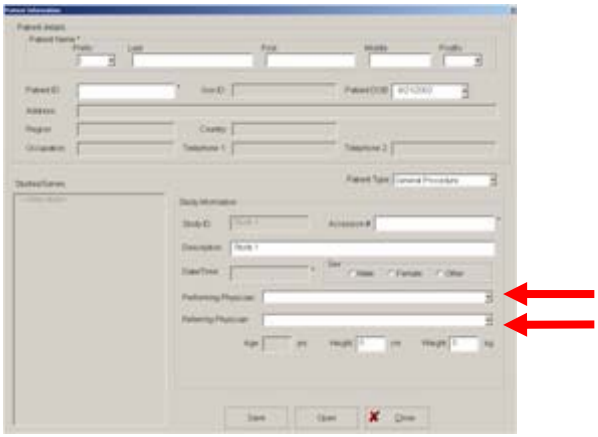
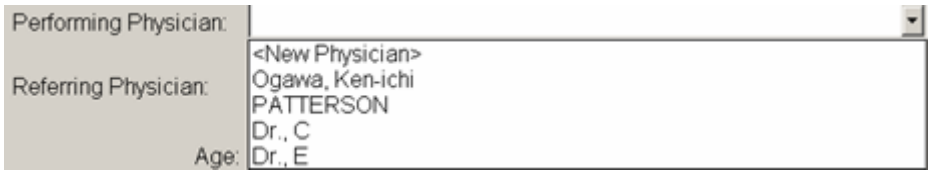
6 Enter Physician's name, using drop down menu boxes for Prefix and Postfix if required.
7 Click on "Add New Physician" button. The doctor's name is added to the list.
8 Repeat these steps to add other physicians to the list.

5.2.2. Delete a physician

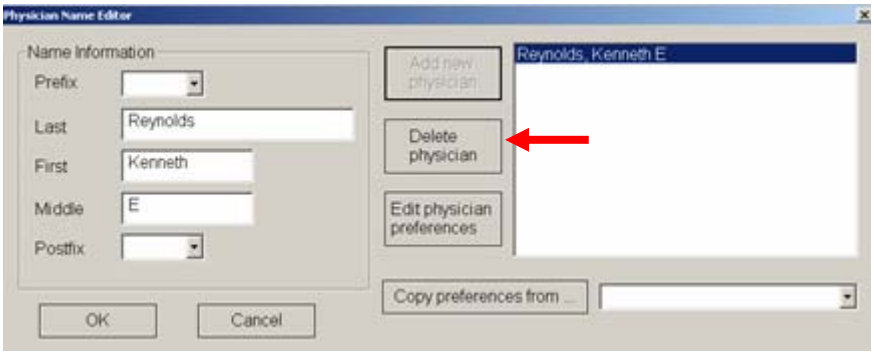
1 Select the *Patient List* button.
2 Select a new or existing patient file.
3 Click on Down arrow for either Performing or Referring Physician.

The resulting menu will show all physicians currently established as well as a **<New Physician>** option. Select the **<New Physician>** option. The ***Physician Name Editor*** will be displayed.





4 Highlight the Doctor's name from the list of those available.



5 Select the **Delete physician** button.
6 You will be prompted to confirm this selection. Click *Yes* to permanently remove the specified physician or *No* to cancel the transaction.

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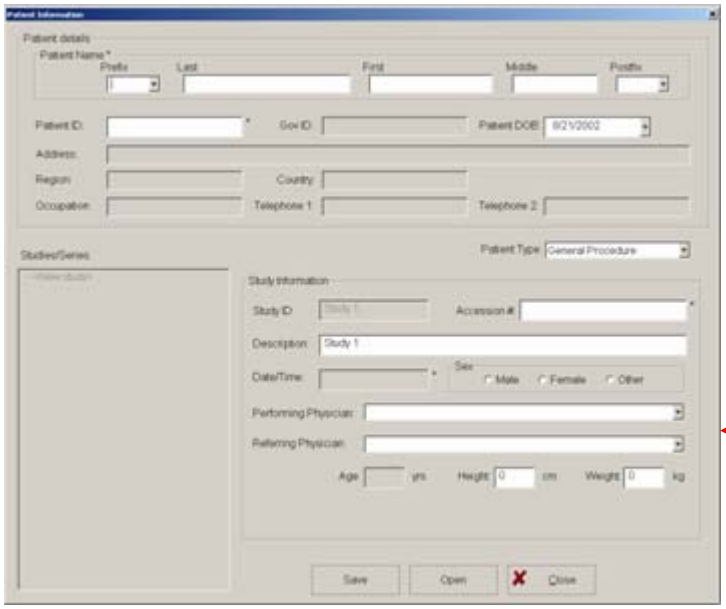
5.2.3. Setting doctor preferences

1 Select the Patient List button.
2 Select a new or existing patient file.
3 Click on Down arrow for Performing Physician.

The resulting menu will show all physicians currently established as well as a **<New Physician>** option. Select the **<New Physician>** option. The ***Physician Name Editor*** will be displayed.



4 Highlight the Doctor's name from the list of those available.

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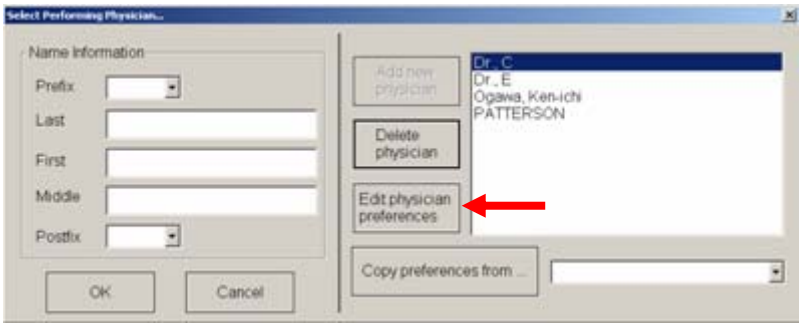
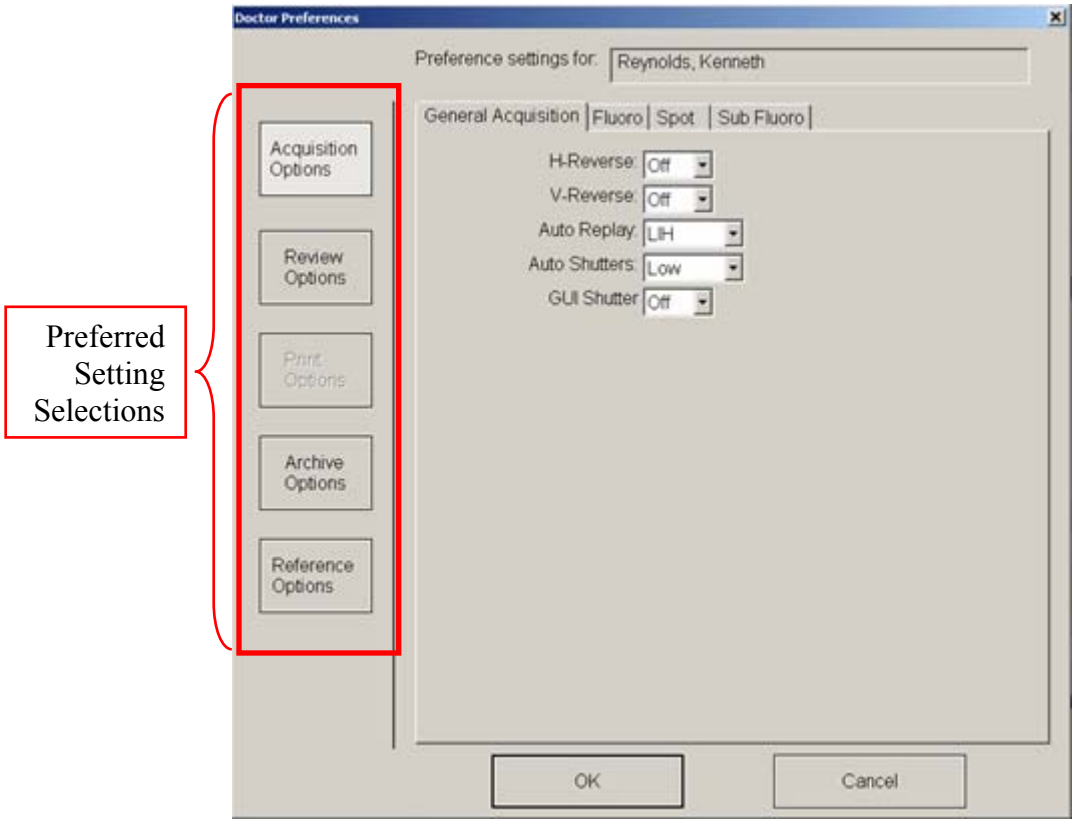


5 Select the Edit physician preferences button.
6 The **Doctor Preferences** screen will be displayed.



Doctor Preferences Edit Screen

7 Select each of the buttons on the left to select the preferred settings for each mode: **Acquisition**, **Review**, **Print**, **Archive**, & **Reference** (each setting is described in detail in Section 06 Acquiring Images).
8 When settings are complete, select the OK button.
9 The **Doctor Preference** screen will close and return to the ***Physician Name Editor*** screen.
10 Repeat steps 1-9 to set the preferences for a different Doctor and when the process is complete, select the **OK** button.

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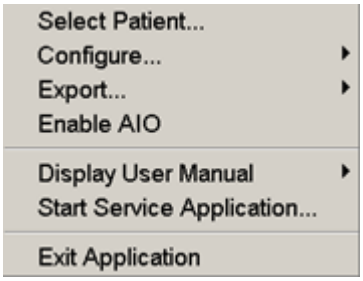
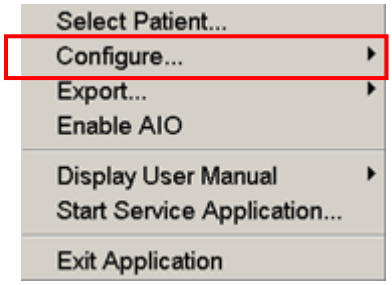
To set doctor preferences from the *Main Image Screen*:

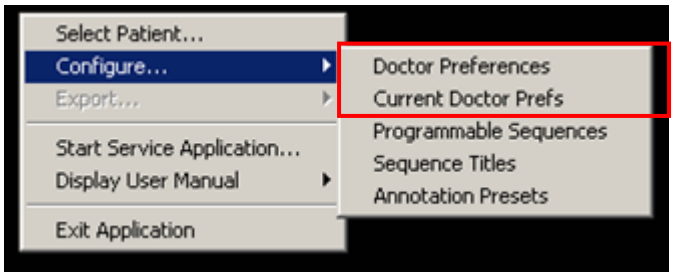
1 ***Right***-click the *Pointing Device* while the *Cursor* is over the image display area. *A Drop-down* menu will be displayed:



RXI - *Right Click Menu*

2 From the available choices, click on Configure... .
The *Custom Configuration Sub-menu* will display.





3 Click on Doctor Preferences to establish new preferences, or click on Current Doctor Prefs to view or change Current Doctor Preferences.

NOTE:
If a Patient is currently OPEN, Doctor Preferences will NOT be available; only Current Doctor Preferences will be available

NOTE:
Current Doctor Prefs opens the Doctor Preferences screen where settings can be changed for the specific physician.

4 The *Physician Name Editor* window will be displayed.

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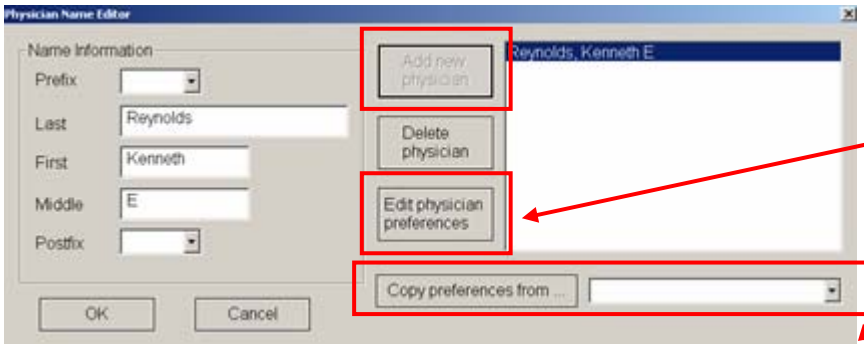

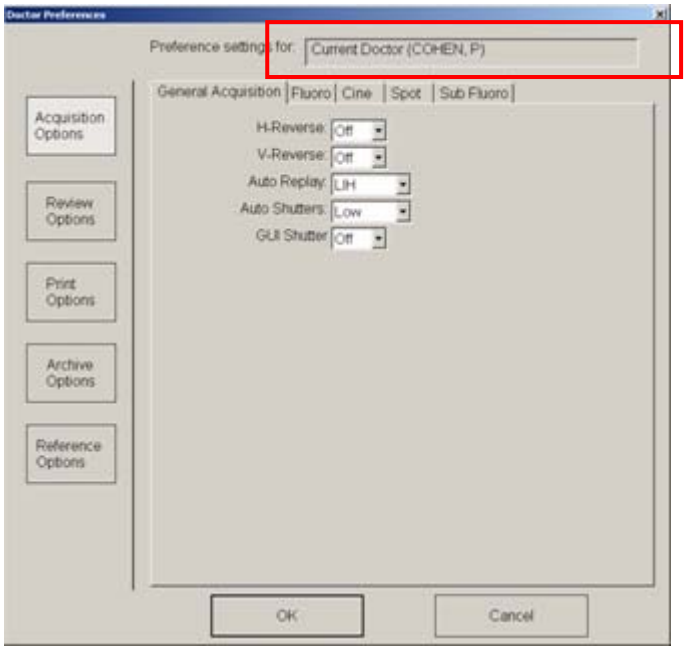

5 To make changes, highlight the doctor's name, and then click the *Edit Physician preferences* button.

6 To add a new Doctor, enter the Dr.'s name, and then select the Add New *Physician* button.

NOTE: Refer to *Chapter 5 – Digital System Preliminary Functions* for complete instructions on adding new physicians.

When adding a new doctor to the list, use the *Preferences* already established for another doctor by selecting the *Copy Preferences* from *Drop down List*.

7 The Doctor Preference screen will be displayed.

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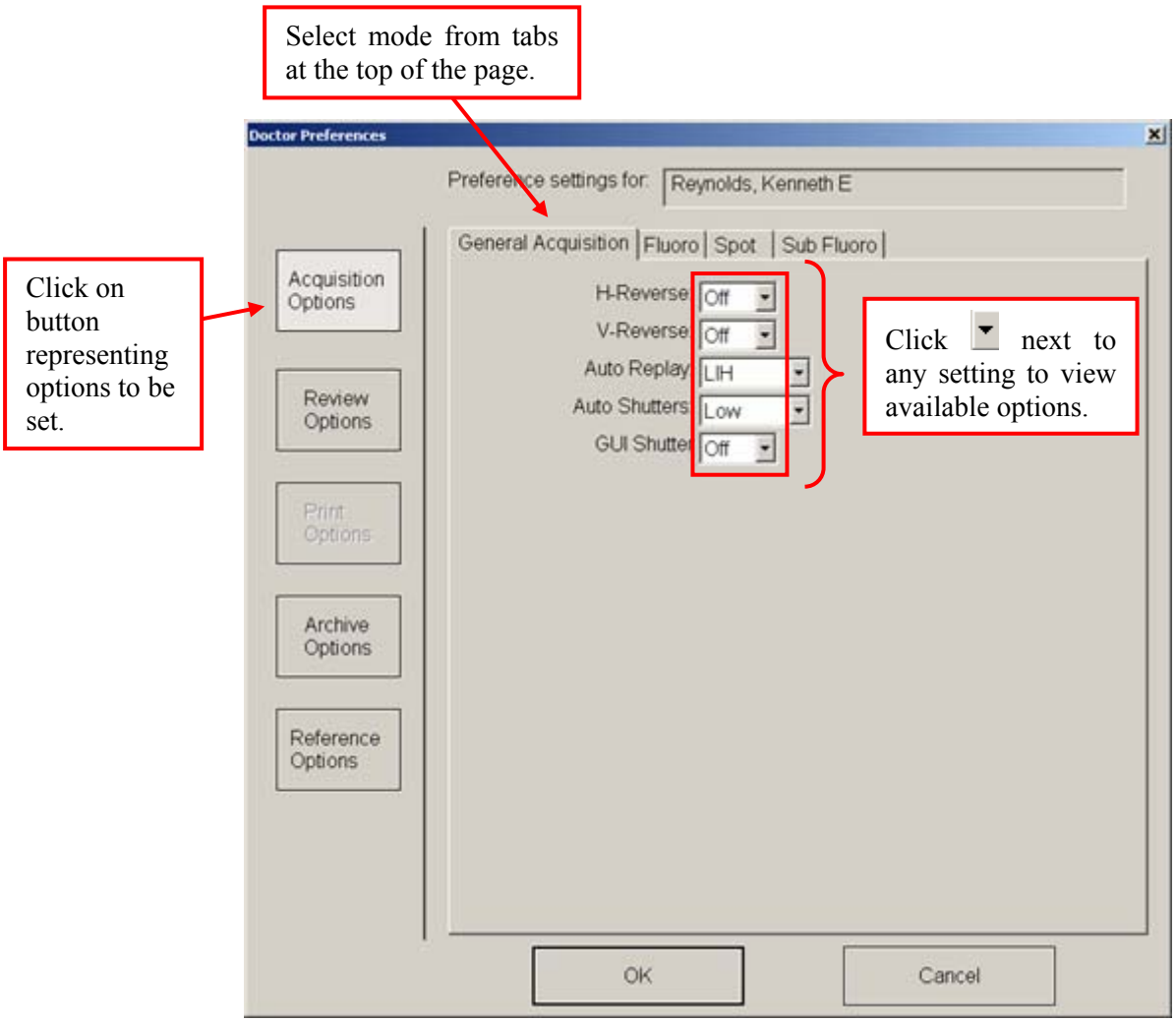

Doctor Preferences Feature Menu

The Default screen is Acquisition Options, General Acquisition tab. Steps 3.4.1 – 3.4.4 describe the options and settings available.

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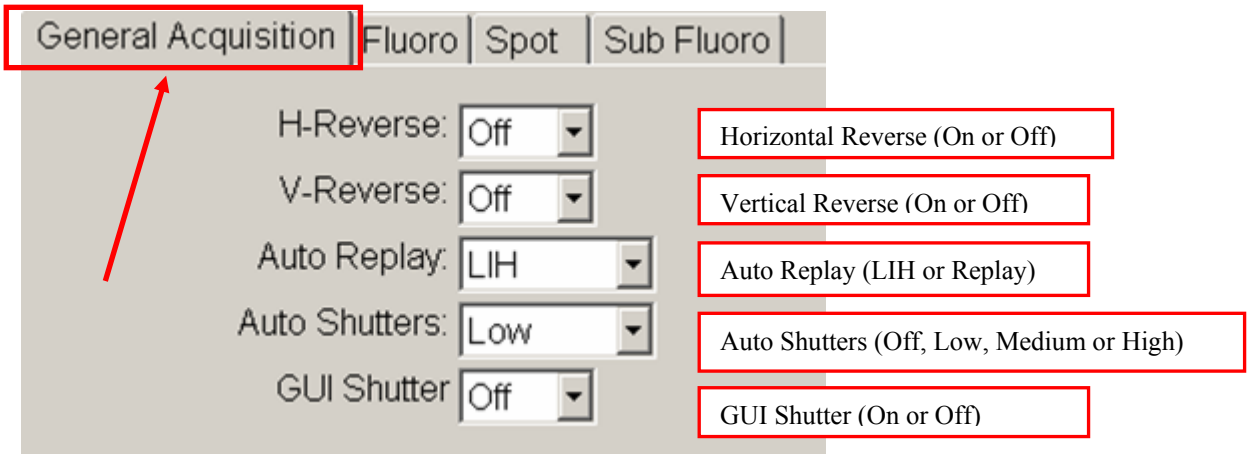
5.2.4. Acquisition Options

5.2.4.1. General Acquisition Mode - Doctor Preferences



Horizontal and Vertical Image Reversal	The H-Reverse and V-Reverse buttons are used to control the orientation of the image acquisition. The next acquired image will be reversed based on the H-Reverse and V-Reverse configuration. If either of these is turned on while the system is in the *Review* mode, the orientation of the current image will not be changed, but the system will reverse the next acquired image.
Auto Replay	Choose to either hold the last image acquired (Last Image Hold - LIH) or for the system to automatically replay the sequence of images (Auto Replay).
Auto Shutters	The system can be set to look for the image boundary and extend the black surrounding shutter to a few pixels beyond that point. Shutter Setting relates to how far the shutter extends once an edge is detected (off, low (few pixels), medium (more pixels), or high (several pixels). Off Low Medium High
GUI Shutter:	During acquisition the icons/controls on right side of screen can be dimmed and reduced to a smaller set of controls. This is considered "GUI Shutters ON". If the GUI Shutter is OFF, the full set of control buttons are visible on the screen.

To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	OK
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	Cancel

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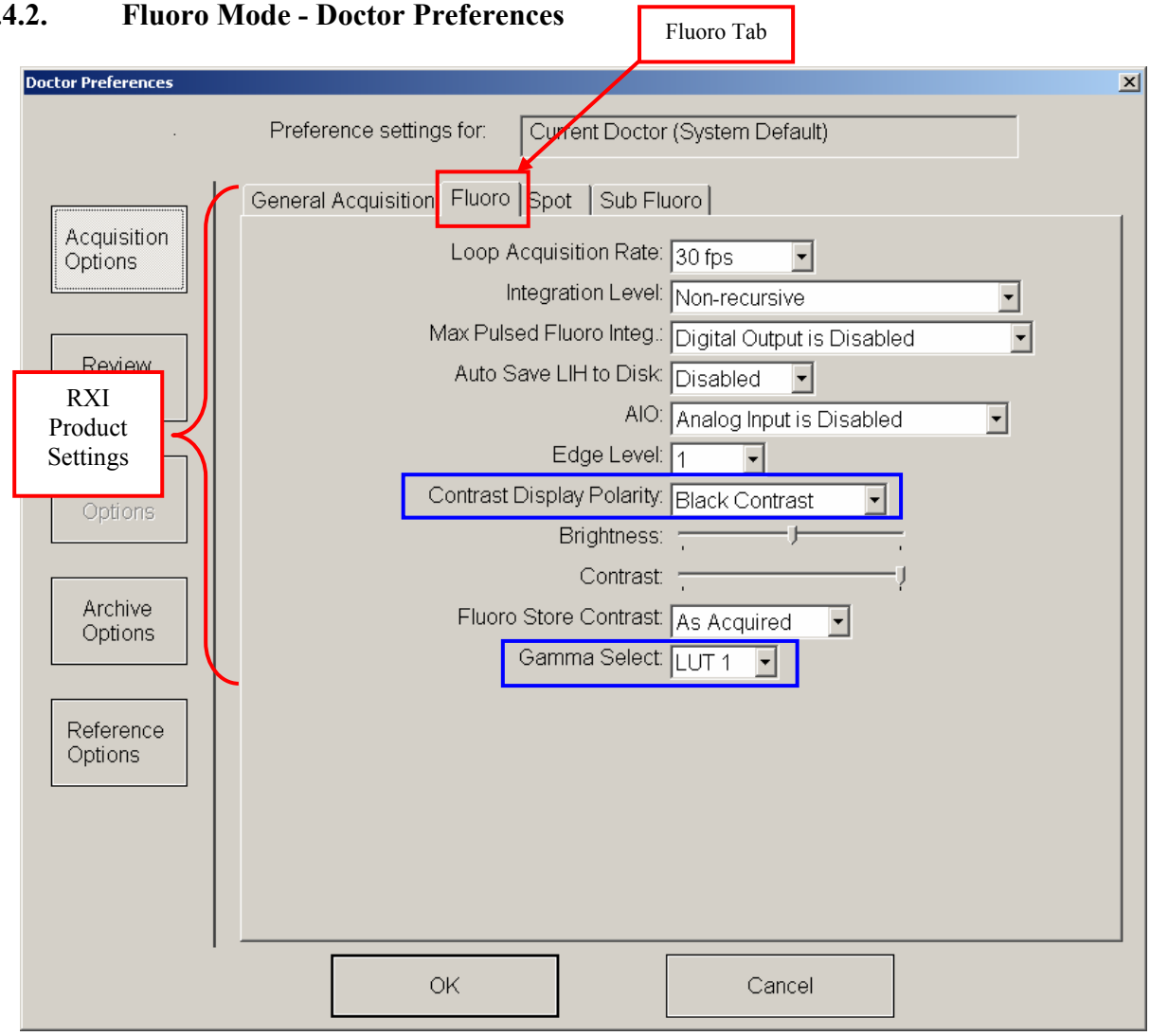
5.2.4.2. Fluoro Mode - Doctor Preferences



Loop Acquisition Rate	Select the desired acquisition **Rate** using the pull-down list. 30 fps 15 fps 7.5 fps 3.75 fps 1 fps
Integration Level (or Real Time Noise Reduction)	Select the desired Integration level using the pull-down list. 2-frame Recursive None 2-frame Recursive 4-frame Recursive 8-frame Recursive Motion Correction Level 1 Motion Correction Level 2 Motion Correction Level 3 Motion Correction Level 4 Motion Correction Level 5 Select the desired level of Integration before applying radiation since the level of filtering reflects the amount of noise reduction during the real-time display, thus affecting the resolution of the stored image. Recursive refers to the system's ability to apply noise reduction to current frame as well as frame (s) prior to it. The Integration setting is not adjustable for images after they are acquired.

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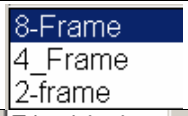
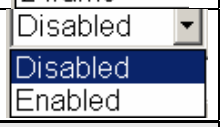
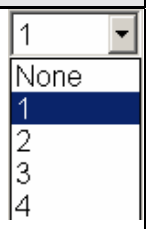
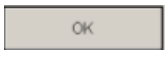
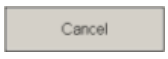
MAX Pulsed Fluoro Integ	Maximum allowed Integration level. Click on down arrow to select the desired integration level using the pull-down list. 
Auto Save LIH to Disk	Click on down arrow to enable or disable this function from drop-down menu. If this is "Disabled" the Last Image Held on the screen will not be saved. 
AIO	***NOTE:*** *AIO is NOT available to Fluoro images.*
Edge Level	Select the desired level of Edge Enhancement. The higher the level of Edge Enhancement applied, the sharper the contrast within the image. There are five possible settings: None, 1, 2, 3, and 4. Higher setting equates to more filtering. Desired setting is site and viewer dependent. The active Edge setting (by image type) will remain active for subsequent image acquisition or image review until changed. Click on down arrow for drop-down menu to select the desired Edge level. 
Contrast Display Polarity	The *Contrast Display Polarity* button changes the *Polarity* of an image from a black *Contrast* image into a white *Contrast* image or vice versa. **Black Contrast:** Black background display for current image. **White Contrast:** White background display for current image.
Brightness	The *Default Brightness* setting can be configured for each image type within *Doctor Preferences.* Use *Slider Control* to select the *Default Fluoro Brightness Value.*
Contrast	The *Default Contrast* setting can be configured for each image type within *Doctor Preferences.* Use *Slider Control* to select the *Default Fluoro Contrast Value.*
Fluoro Store Contrast	Use this feature to *Store Fluoro* images with a desired *Contrast*. This feature works with *Contrast Display Polarity*. Select one of the following settings from drop-down menu **As Acquired:** Image will be stored with contrast defined for acquisition **White:** Image will be stored with White Contrast **Black:** Image will be stored with Black Contrast
Gamma Select	This feature allows for more advanced *Customization of LUTs (Display Lookup Table)* by offering five different *Programmable LUT* selections. Normally, the *Default LUTs* are adequate and this tool is not normally needed in most *Clinical Applications.* To use this feature, click on *Down Arrow* (▼) for *Drop-down* menu to select the desired *Gamma Level.* Gamma Levels: LUT 1, LUT 2, LUT 3, LUT 4 and LUT 5.

To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	

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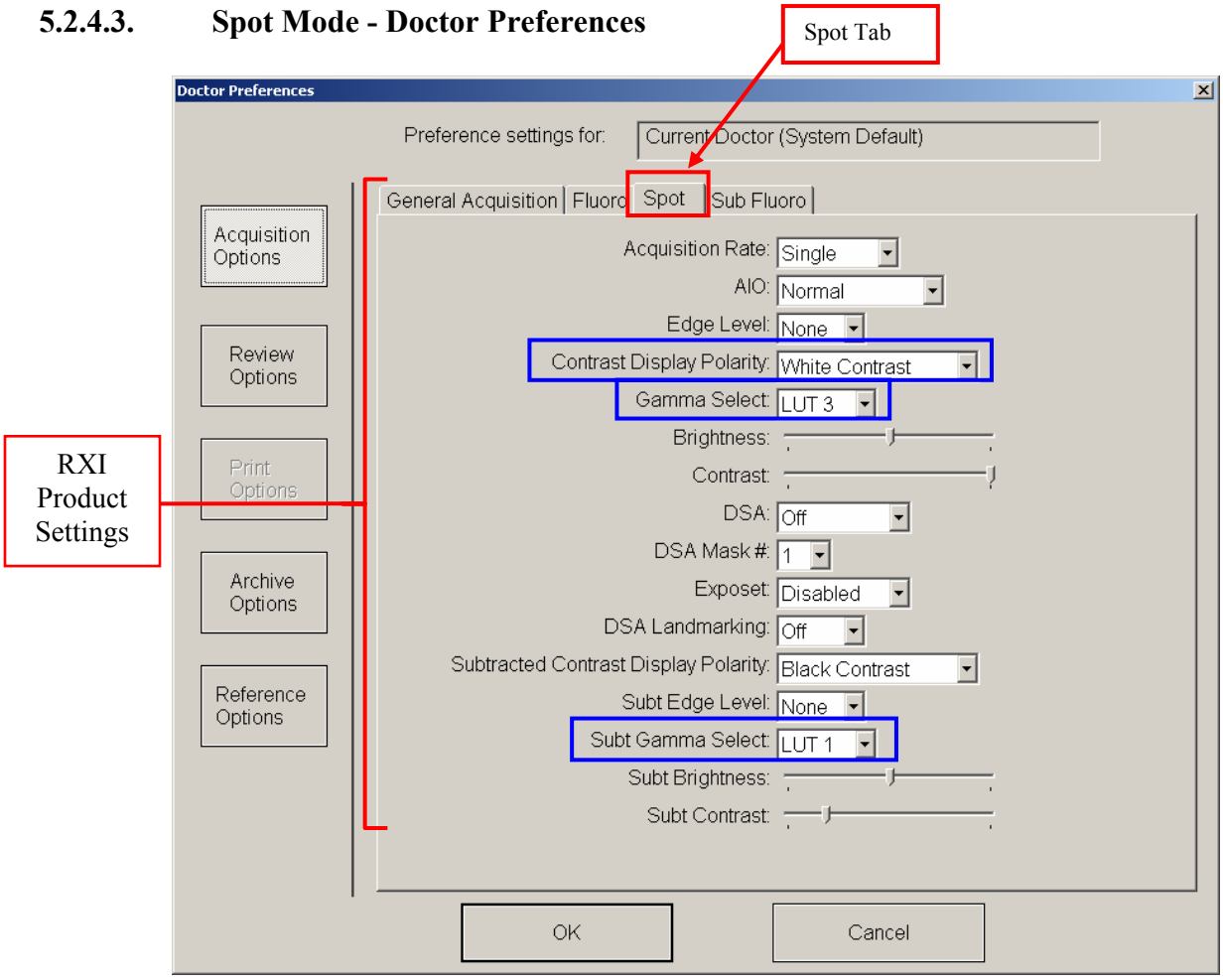
5.2.4.3. Spot Mode - Doctor Preferences



Acquisition Rate	Select a value from the **RATE** pull-down list to control the rate at which images are acquired. Click on down arrow (▼) to select rate from drop-down menu. Single Single 0.5 FPS 1 FPS 2 FPS 3 FPS 4 FPS 5 FPS 6 FPS 7.5 FPS 10 FPS 15 FPS

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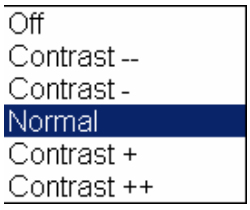
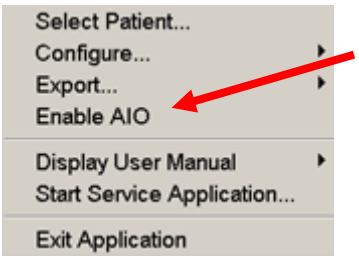
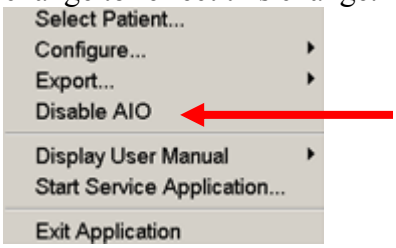
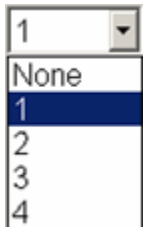
AIO	The Auto Image Optimization feature optimizes the contrast range and selects appropriate Window and Level values for an image as it is acquired. If the feature is installed but not enabled, the system will use the Default Window, Level, and Display Lookup Tables (Display Lookup Tables are used to select the amount of Contrast for an image).  Click on down arrow for drop-down menu to select the desired AIO level. If AIO has been configured for image Acquisition in Review mode, you can turn Off Image Optimization from the Main Image screen using the Right click menu.  To enable AIO, position cursor over Enable AIO and left click. The menu will change to reflect this change.  If AIO is not Enabled when performing image Acquisition, the Enable/Disable AIO button will not appear on the Right click menu.
Edge Level	Select the desired level of Edge Enhancement. The higher the level of Edge Enhancement applied, the sharper the contrast within the image.  There are five possible settings: None, 1, 2, 3, and 4. Higher setting equates to more filtering. Desired setting is site and viewer dependent. The active Edge setting (by image type) will remain active for subsequent image acquisition or image review until changed.
Contrast Display Polarity:	The *Contrast Display Polarity* button changes the *Polarity* of an image from a black *Contrast* image into a white *Contrast* image or vice versa. **Black Contrast:** Back background display for current image. **White Contrast:** White background display for current image.
Gamma Select	This feature allows for more advanced customization of LUTs by offering five different programmable LUT selections. Normally, the default LUTs are adequate and this tool is not normally needed in most clinical applications. To use this feature, click on the down arrow for drop-down menu to select the desired *Gamma level*. Gamma Levels: LUT1, LUT2, LUT3, LUT4 or LUT5

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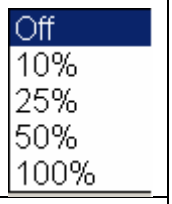
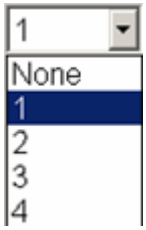
Brightness	Use *Slider Control* to select the *Default Fluoro Brightness Value.* This will only be applied if *AIO* is *OFF.*
Contrast	Auto-Image Optimization (AIO) is recommended for all unsubtracted image types. However, in the absence of AIO, the default Contrast setting can be configured for each image type within Doctor Preferences. Use slider control to select the default Fluoro Contrast value. This will only be used if AIO for the Fluoro image type is OFF.
DSA	Use drop-down menu to turn DSA on or off on this system
DSA Mask #	Use drop-down menu to select mask # from those available – 1,2,3,4,5,6,7,8,9.
Exposet	The Exposet feature is currently NOT available.
DSA Landmarking	Use *Drop-down* menu to turn *Landmarking On or Off* on this system. Click to select the desired *Percentage (%)* setting from *Drop-down* menu. 
Subtracted Contrast Display Polarity	The *Contrast Display Polarity* button changes the *Polarity* of an image from a black *Contrast* image into a white *Contrast* image or vice versa. **Black Contrast:** Back background display for current image. **White Contrast:** White background display for current image.
Subtracted Edge Level	Select the desired level of Subt. Edge Enhancement. The higher the level of Edge Enhancement applied, the sharper the contrast within the subtracted image There are five possible settings: None, 1, 2, 3, and 4. Higher setting equates to more filtering. Desired setting is site and viewer dependent.  The active Subt Edge setting (by image type) will remain active for subsequent image acquisition or image review until changed.
Subtracted Gamma Select	This feature allows for more advanced customization of LUTs by offering five different programmable LUT selections. Normally, the default LUTs are adequate and this tool is not normally needed in most clinical applications. To use this feature, click on the down arrow for drop-down menu to select the desired *Gamma level*. Gamma Levels: LUT1, LUT2, LUT3, LUT4 or LUT5
Subtracted Brightness	Use slider control to select the subtracted Brightness value.
Subtracted Contrast	Use slider control to select the subtracted Contrast value.

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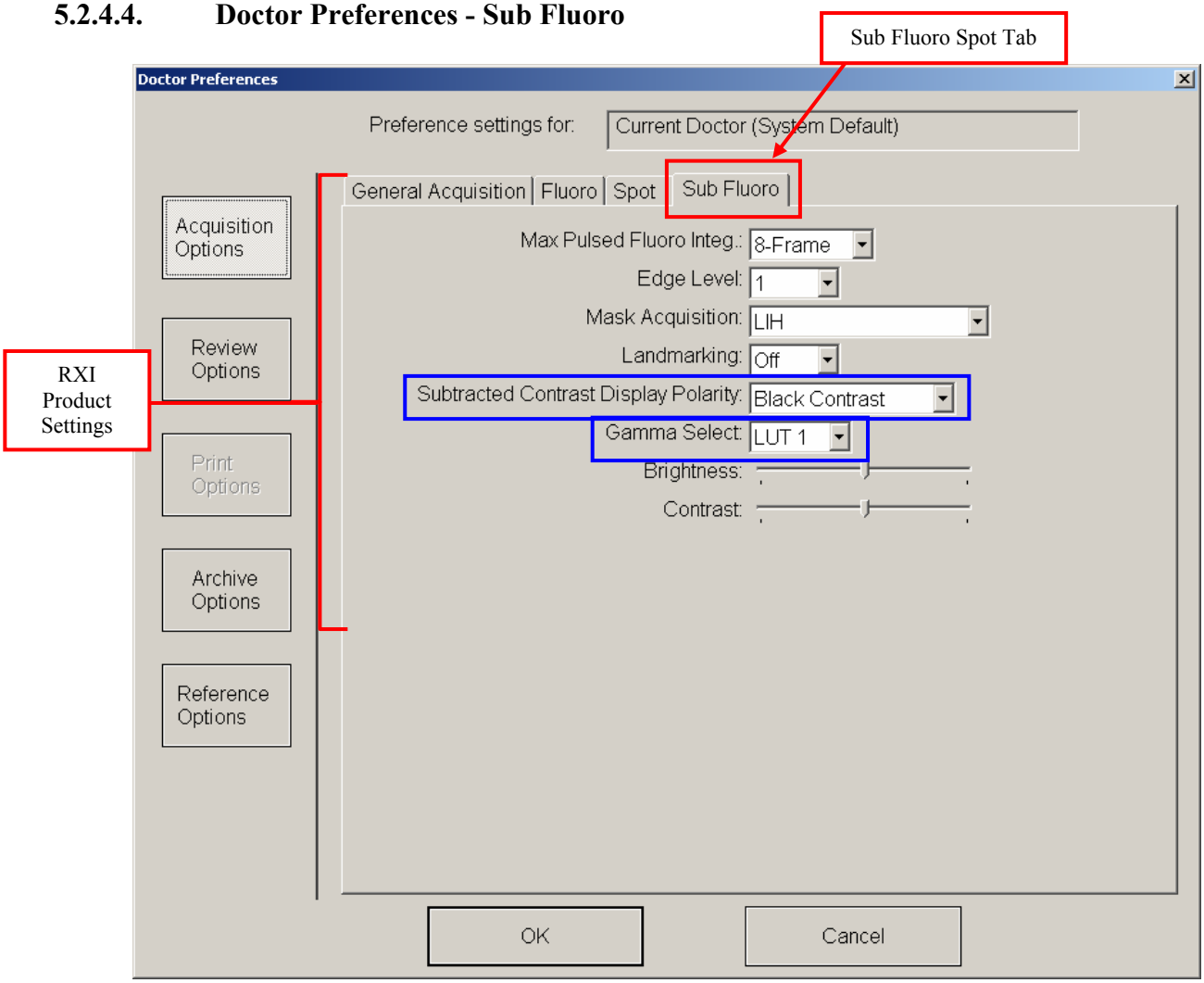
To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	OK
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	Cancel

5.2.4.4. Doctor Preferences - Sub Fluoro



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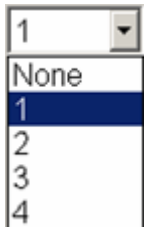
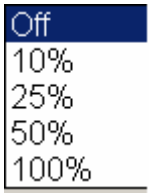
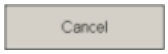
Max Pulsed Fluoro Integration Level	Click on down arrow to select Maximum allowed integration level from drop-down menu. Select 8-Frame, 4_Frame, 2_Frame or 1_Frame.
Edge Level	Select the desired level of Edge Enhancement. The higher the level of Edge Enhancement applied, the sharper the contrast within the image There are five possible settings: None, 1, 2, 3, and 4. Higher setting equates to more filtering. Desired setting is site and viewer dependent. The active Edge setting (by image type) will remain active for subsequent image acquisition or image review until changed. 
Mask Acquisition	Click to select *Mask Acquisition* setting from *Drop-down* menu. This feature is only available in DSA.
Landmarking	A small amount of the mask image is added back to the subtracted image. Landmarking is usually performed to assist the doctor in preparation of invasive procedures. Click on down arrow to select % from drop-down menu. 
Subtracted Contrast Display Polarity:	The *Subtracted Contrast Display Polarity* button changes the *Polarity* of an image from a black *Contrast* image into a white *Contrast* image or vice versa. **Black Contrast:** Back background display for current image. **White Contrast:** White background display for current image.
Gamma Select	This feature allows for more advanced customization of LUTs by offering five different programmable LUT selections. Normally, the default LUTs are adequate and this tool is not normally needed in most clinical applications. To use this feature, click on the down arrow for drop-down menu to select the desired *Gamma level*. Gamma Levels: LUT1, LUT2, LUT3, LUT4 or LUT5
Brightness	Use *Slider Control* to select the *Default Sub Fluoro Brightness Value.* This function can only be changed within the Service Application.
Contrast	Use *Slider Control* to select the *Default Sub Fluoro Contrast Value.*

To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	

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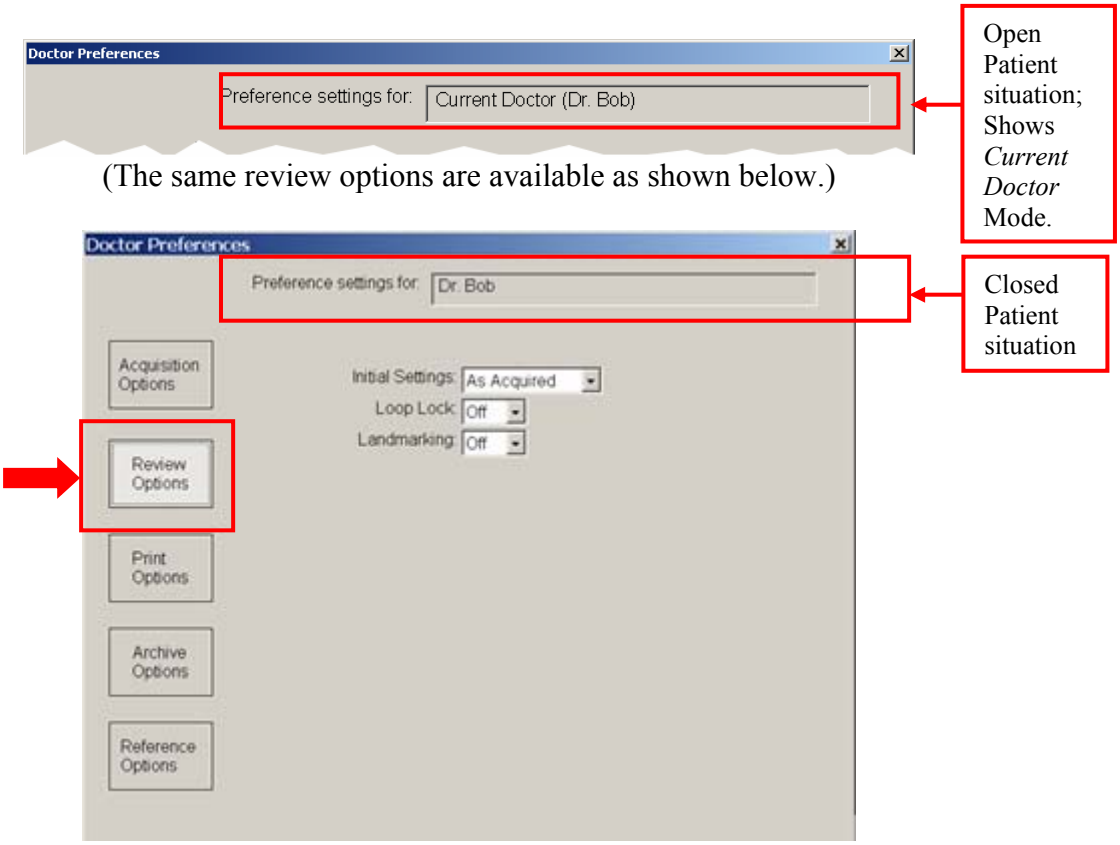
5.2.5. Review Options – Doctor Preferences



Initial Settings	Determine how image will be present during the review process either with settings made during acquisition or when last reviewed.	As Acquired Last Viewed
Loop Lock	Lock replay within a sequence or with a study. Turn on or off by selecting from drop down menu.	Off On
Landmarking	A small amount of the mask image is added back to the subtracted image. Landmarking is usually performed to assist the radiologist in preparation of invasive procedures Click on down arrow to select % from drop-down menu.	Off 10% 25% 50% 100%
To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	OK
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	Cancel

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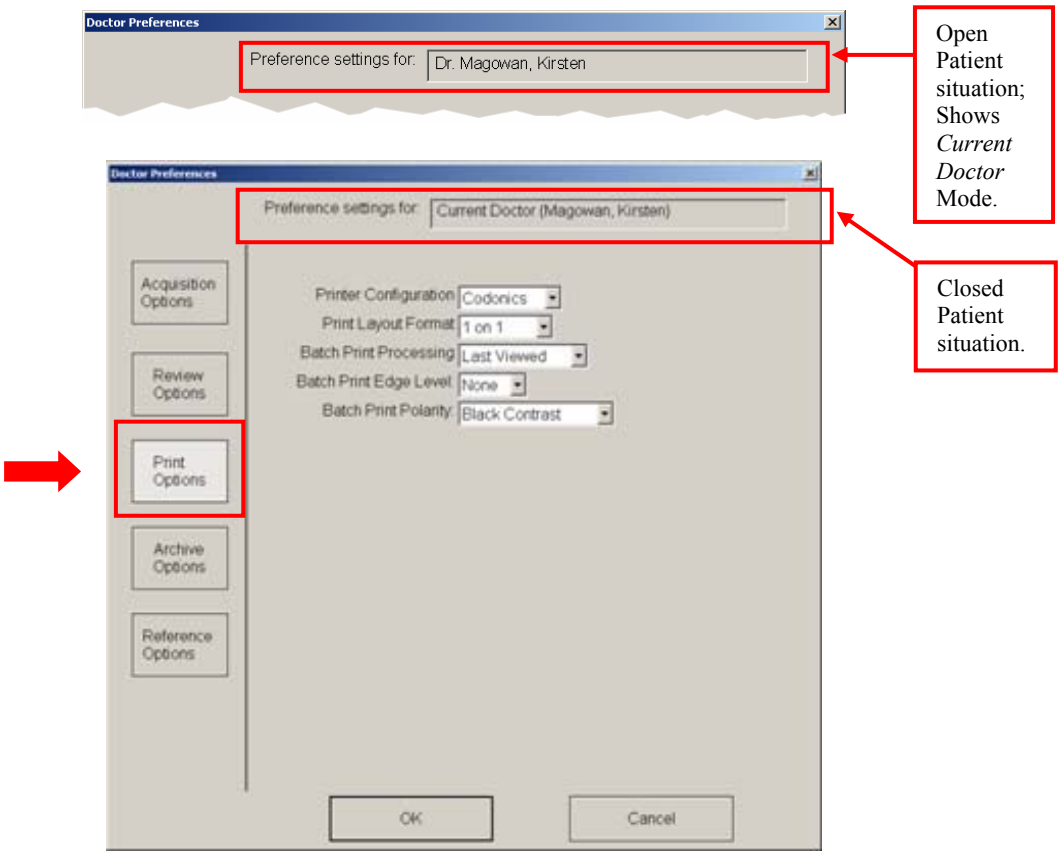
5.2.6. Print Options – Doctor Preferences



Printer Configuration	Select default printer from a list of installed printers. Config 1 Config 2
Print Layout Format	Select number of images to be printed per sheet or film. 1 on 1 2 on 1 Vertical 2 on 1 Horizontal 4 on 1 6 on 1 9 on 1 12 on 1
Batch Print Processing Settings	Select how images are to be printed – as they were viewed, or with *PACE Parameters* applied. Last Viewed As Acquired PACE
Batch Print Edge Level	Select amount of *Spatial Edge Enhancement* to be used for conducting *PACE* printing operations if *PACE* is selected. The higher the *Level of Edge Enhancement* applied, the sharper the *Contrast* within the image. None 1 2 3 4

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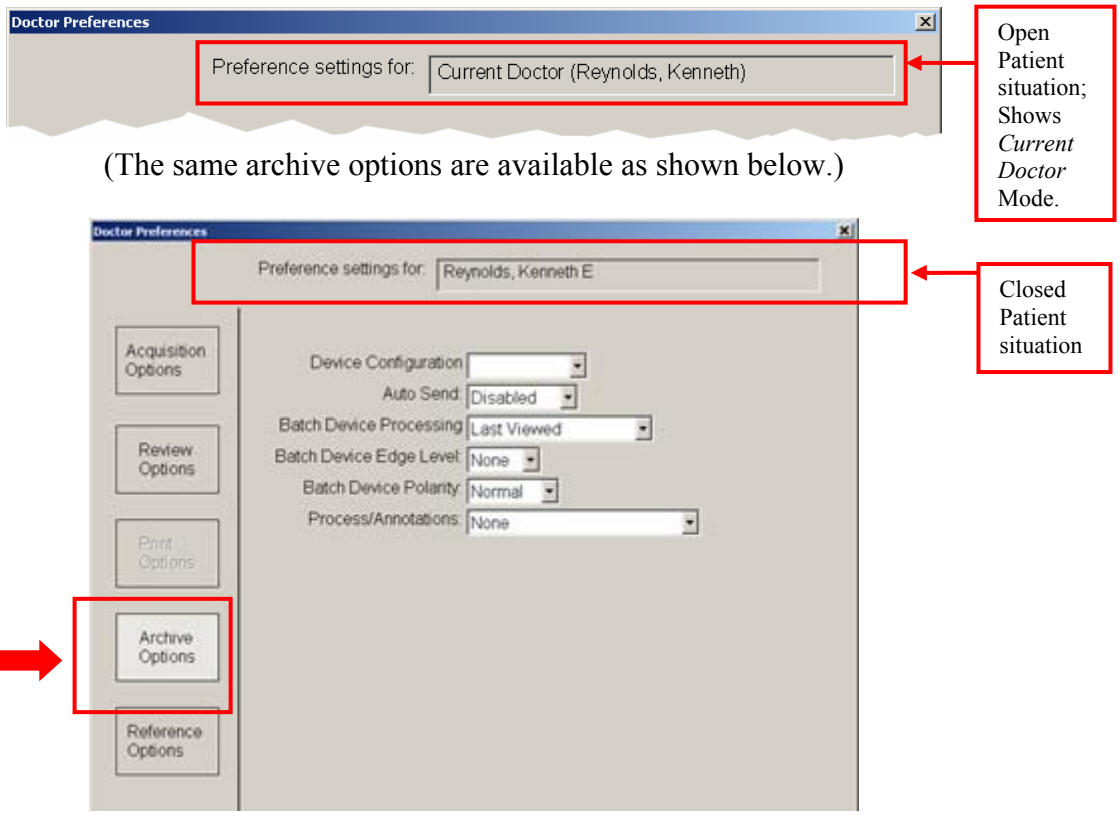
Batch Print Polarity	Select the *Polarity* to be used for *PACE* printing. Black Contrast White Contrast	
To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	OK
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	Cancel

5.2.7. Archive Options – Doctor Preferences



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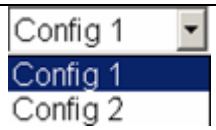
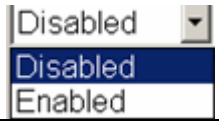
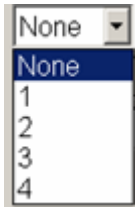
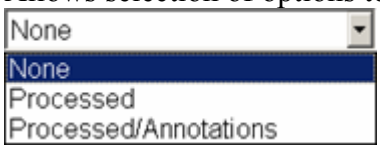
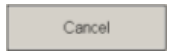
Device Configuration	 Select which device will be used as the default Archive device.
Auto Send	When this feature is *Enabled*, the system will automatically send the new acquired images to the selected *Archive Device*. 
Batch Device Processing	This feature controls which processing settings will be used when Archiving images (as they were Last Viewed, as they were originally acquired or with Batch Settings set at this screen).
Batch Device Edge Level	Select the level of Edge Enhancement to be used for the Archive functions. The higher the level of Edge Enhancement applied, the sharper the contrast within the image. 
Batch Device Polarity	Select the Polarity to be used when archiving images. For RXi Product…
Process Annotations	Allows selection of options to be applied to images to be archived.  **None** No features will be applied **Processed** Image processing features will be applied **Processed/Annotations** Both image processing features and Annotations will be applied. Annotations cannot be edited.

To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	

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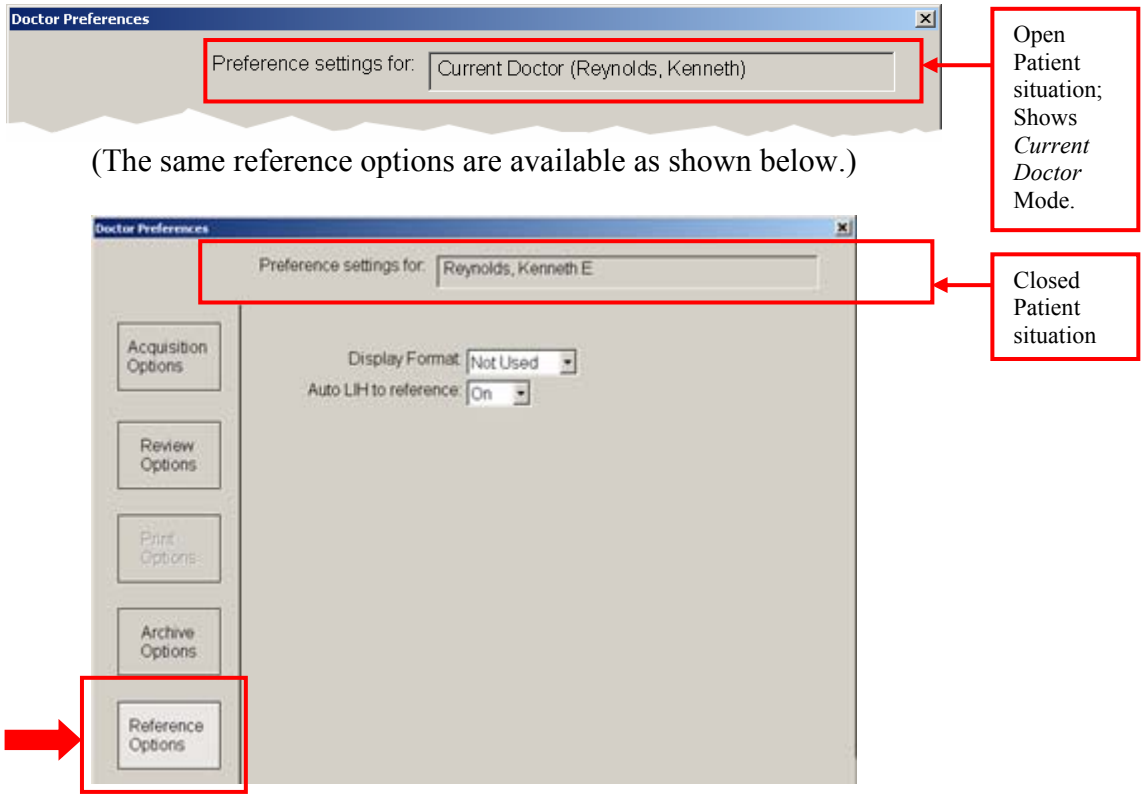
5.2.8. Reference Options – Doctor Preferences



Display Format	This preference is only available when the Multi-format Reference Image Display option is installed.	
Auto LIH to Reference	The Auto LIH to Reference feature automatically transfers each LIH image to the Reference Display when the next acquisition begins. Select **ON** to activate this feature.	
To save settings and exit Doctor Preferences…	Click on OK button at the bottom of the screen	OK
To cancel setting and reset default…	Click on the Cancel button at the bottom of the screen	Cancel

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6. Acquiring Images

Once a patient file has been set up, images can be acquired for that patient. This section is a guide to the features and functions available when acquiring images. This section assumes that a patient file is open and a study selected.

Precision RXi does not alter the operation of the x-ray generator. The technical factors on the generator are normally set in the same manner as previous to the installation. The system is calibrated to provide optimal imaging while striving to reduce dose. However, the GE Clinical Application Specialist may recommend revised technical factors for acquiring optimal digital images.

It has been proven that high quality digital images can be acquired with less exposure. The following guidelines are recommended. The system may be limited by generator capabilities.

Please refer to the Appendix Chapter for Exposure Factor Guidelines and recommended techniques.

	This icon will display in the lower right corner of the *Main Image* screen whenever *Fluoro* images are being acquired.

6.1. Precision RXi Clinical Application Display Information

The display information is shown ONLY within the *Clinical Application* to provide the *Technologist or Reviewer* pertinent patient and study information. More data on display items are discussed later in this section.

NOTE:
Once display data is saved/stored as part of the image, it can be reviewed with images or sequences and can be printed or sent to PACS.

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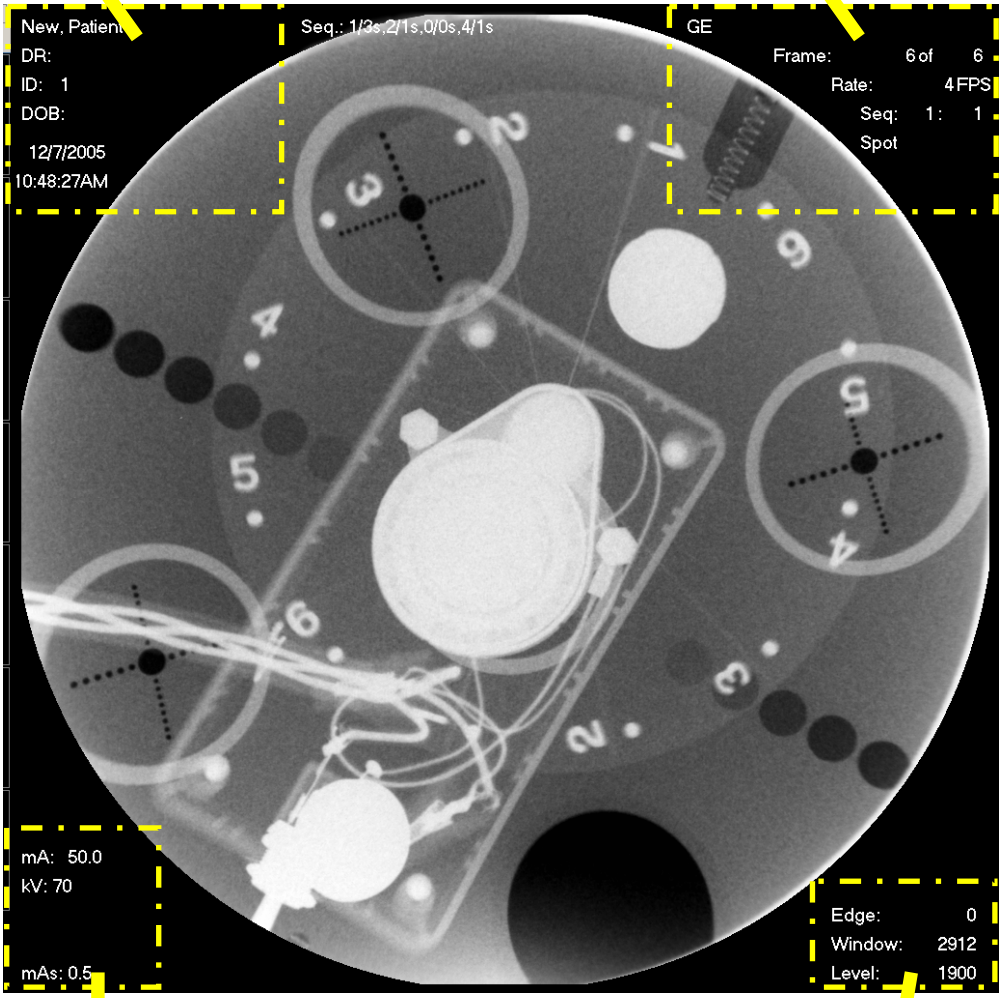
Top Left Corner Display Data:	**Top Right Corner Display Data:**
• Currently OpenPatient • Doctor's name, • ID • Date of Birth • Date • Time	• Company / Hospital Name • Frame: The displayed frame of the total number of frames available • Rate: Frames Per Second (FPS) setting • Seq: Assigned sequence number "1: 1" • Spot



Main Image Display Showing Patient/Study Information

Bottom Left Corner Display Data:	**Bottom Right Corner Display Data:**
• mA: • kV: • mAs: (Definitions found on following page) Also… • Fluoro Time (would be shown if performing Fluoro procedure, instead of Spot acquire)	• Edge: (digital imaging processing filter used for sharpening; typically to increase edge definition between tissue, bone, soft masses; to better define foreground and background differences.) • Window: (Degree of black and white contrast applied to image) • Level: (Brightness of the image)

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6.1.1. Display Definitions and Descriptions

CLINICAL APPLICATION VALUE DISPLAYS – DESCRIPTIONS:

FPS: Frames per second, Rate of acquire

Fluoro Time: Shows total cumulative time patient has been exposed to radiation during their Fluoroscopic exam.

mA: Milliamperes – Time; the higher the current, there is an increase in the quantity of x-rays. "The mA controls the number of electrons produced per unit time which controls the amount of radiation produced by the target. The total radiation produced is proportional to the product of the milliamperes and the exposure time in seconds and is expressed as mAs or milliamperes-seconds."

kV: Kilovoltage (one word) describes the penetrating ability of x-rays. Inside the x-ray tube are three components, a cathode, anode and a glass envelope designed to allow x-rays to penetrate. X-rays occur when the cathode is heated and voltage is applied to force the heated electrons to the anode. When the electrons strike the anode, x-rays are produced. As the user increases the kilovoltage, the electrons move faster (increased frequency) and the x-ray energy is increased. The voltage controls the electron speed. kVp refers to peak voltage as voltage may fluctuate. kVp determines the quality of the x-ray beam which impacts image quality in a very important way. Image Contrast is determined by kVp.

mAs: Determines the quantity and intensity of the x-rays that are produced. mA refers to the Density of the image.

OTHER VALUES DISPLAYED WITHIN RTP – DESCRIPTIONS:

AKR: Air Kerma Rate – Shows rate of radiation exposure used to obtain good quality imaging for a specific procedure.

CAK: Cumulative Air Kerma – Reflects total Air Kerma (radiation) the patient is exposed to during entire exam; includes all contributions from fluoroscopic and radiographic irradiation.

DAP: Dose Area Product

Gy: (Gray) – Kerma is measured in J/kg. The special name for the unit of Kerma is Gray.

Kerma: The sum of the initial energies of all the charged particles liberated by uncharged ionizing particles in a material of given mass as defined by the international commission on Radiation Units and Measurements (Gy).

kVp: Penetrating power of the x-ray. It determines the quality of the image in reference to its Contrast.

mGy: (milligray) – A unit of measure; Gray being the special name for the unit of Kerma.

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6.1.2. Descriptions of Common RF X-ray Projections

This Imaging System is set for all of the possible categories and projections listed below:

AP: Anterior Posterior; where the patient's back is against the table; center ray enters through the front of the patient; can be standing, sitting, or recumbent.

PA: Posterior Anterior (Posteroanterior); where patient faces table and image receptor; center ray enters through back of patient; can be standing, sitting, or recumbent.

RAO: Right Anterior Oblique; where the front body surface is tilted to the RIGHT side of the table, closest to the Image Receptor (IR).

LAO: Left Anterior Oblique; where the front body surface is tilted to the LEFT side of the table, closest to the IR.

Lateral: Where the central ray enters the body perpendicularly; where patient is situated with left or right shoulder facing table and closest the Image Receptor.

Anterior: Where x-ray enters from the front of the body.

Posterior: Where x-ray enters from the back of the body

Oblique: Where x-ray enters from any angle to either the front or back side of the body

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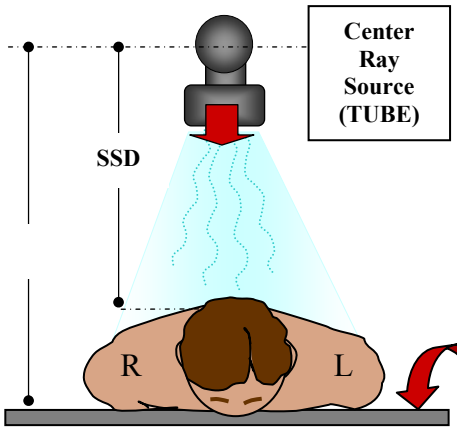
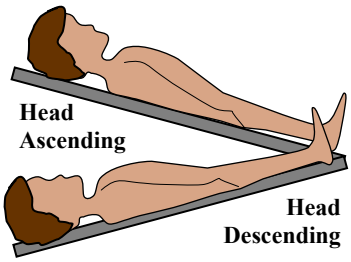
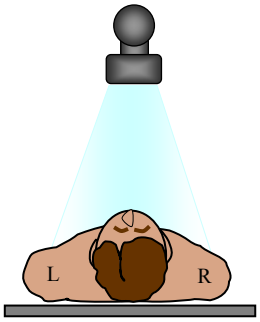
6.1.2.1. Common RF X-ray Position Examples

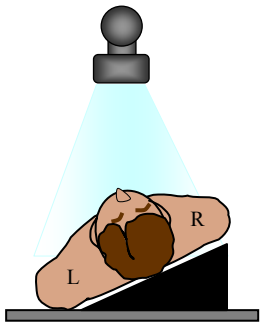


PA = POSTERIOR- ANTERIOR
(enter at back; exit at front)

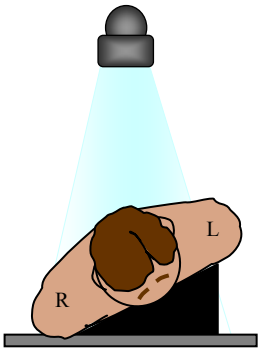




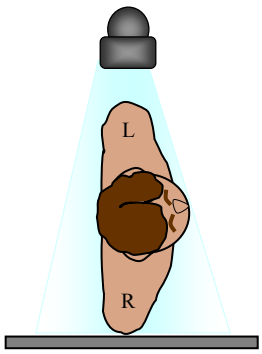
AP = ANTERIOR-POSTERIOR
(enter at front; exit at back)



L- POSTERIOR OBLIQUE
(# degrees at an angle)



RAO = RIGHT ANTERIOR OBLIQUE
(# degrees at an angle)



RIGHT LATERAL
(90 degree angle)

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6.2. Fluoro Acquisition & Display

6.2.1. Fluoro Loop

This feature allows acquisition and storage of multi-frame sequences of fluoro images (acquisition rate = 3.75, 7.5, 15, 30 frames per second when the system is configured at 30/60Hz). The maximum size for a Fluoro Loop sequence is dependent on the size of the system's memory:

Configuration	Maximum Number Images
256MB	50 images
512MB	100 images

When the maximum number of images is reached, new images begin replacing the oldest images (i.e. wrap-around).
Sequences acquired in this manner are only temporary unless manually stored to the local database. Subsequent fluoro exposures overwrite the previous sequence in memory, and only one sequence is held in memory at a time.
After *Fluoro Loop* is acquired, user can click *Store Loop* to save current *Sequence* to the database. Refer to the *Fluoro* and *Store Loop Chart* on the following page for more information.

CAUTION: **Do NOT attempt to acquire a new Fluoro Loop while the current one is being saved.** Once the function is complete, the icon will disappear and a new Fluoro Loop can be acquired.

Pulse Fluoro Synchronization Feature
If the system is being used with a CPI generator/touch screen, note that changing the pulsed fluoro rate on the touch screen will automatically change the fluoro loop acquisition rate. Alternately, changing the fluoro loop acquisition via the Processing Panel will change the pulsed fluoro rate on the CPI generator/touchscreen.

	Whenever *Fluoro* images are being acquired, this icon will display in the lower right corner of the *Main Image* screen**.** Additionally, the *Main Image* screen will reflect *Rates, Doses, Applied Features* and *Patient Information.*

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Store Loop and Fluoro Loop Buttons

	1. To activate the feature, click the Fluoro Loop button on the Standard Control Box on the Main Image screen. While this feature is activated, the Store Image button will be disabled (grayed out). This is to prevent storing single images while Fluoro Loop is in progress.
	2. To store the current Fluoro Loop to the database, click on the Store Loop button at the Main Image screen.
Store Loop in Process Icon	3 While the system stores the Loop of images to the database, an icon will be displayed at the lower left of the Main Image screen.
	4 When finished, click the Fluoro Loop button again to deactivate.

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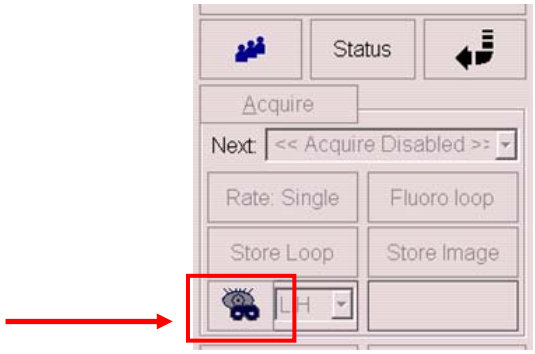
6.2.2. Fluoro Roadmapping (DSA Only)

Roadmapping is an *acquisition* mode where the system subtracts one image from subsequently acquired images. Only the difference between the *mask* and each of the newly acquired images is shown.

6.2.2.1. Activating/Deactivating Fluoro Roadmapping

1 Left click on the Mask button.
2 The text within the dialog box will "light up" (change from gray to white).



There are three ways of selecting the image to be used as the mask image.

- LIH (Using the Last Image Hold on the screen)
- Max Opacification
- Minimum Opacification

6.2.2.2. Last Image Hold – Mask Acquisition (DSA Only)

1 While producing fluoro radiation, inject the target vessel with a contrast agent
2 When the target area is full of contrast, release fluoro to obtain an LIH image
3 The resulting LIH image will be the mask
4 Activate fluoro again to acquire the roadmap image

Subtracted Acquisition	Producing fluoro radiation on a plane that has acquired a mask will result in subtracted display of the new fluoro images
Subtracted LIH	Releasing fluoro during subtracted display will result in a subtracted LIH image.

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6.2.2.3. Max Opacification - Mask Acquisition (DSA Only)

This feature provides for subtracted fluoro roadmapping display on the Primary In-room Monitor by utilizing a maximally opacified composite image created during contrast injection as the mask image.

6.2.2.4. Min Opacification – Mask Acquisition (DSA Only)

This feature provides for subtracted fluoro roadmapping display on the Primary In-room Monitor by utilizing a minimally opacified composite image created during contrast injection as the mask image.

6.2.3. Fluoro Override

Any time Fluoro Radiation is active the images will be displayed on the Primary In-room monitor with no obstructing graphics or text. The live image will replace the current image, and when fluoro radiation is terminated the last complete image frame will become the new LIH image if currently in the acquire mode.

If in the review mode, the live fluoro image will replace the current image. When fluoro radiation is terminated, the previously displayed image that was already stored to the disk will be displayed again.

6.3. Photospot Acquisition & Display

Photospot sequences are acquired using the existing generator controls, such as a two-position footswitch.
The first position activates “Prep” and the second position activates “Request for Exposure”. As images are acquired (at the selected rate) they are all cached in memory and stored to the local database.
To stop Photospot acquisition, release the spot generator control switch.
The system will remain in Acquisition mode and another photospot sequence can be acquired by reactivating the generator controls. The “Acquire” button does not need to be reselected.

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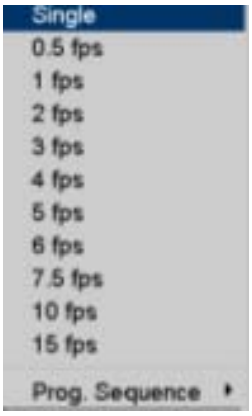
NOTE:
A New Patient will automatically be in Acquire mode. The procedure below only needs to be performed when you are appending to a Patient.

Select the *"Acquire"* button on the *Main Image* screen. Define either a *New Patient Study* or use an existing *Study*. This button will remain active until selected again.

Left click to display options:
(depending on how the system is configured):

Rate: Single | Rate: 2 fps

- Single
- 0.5 fps
- 1 fps
- 2 fps
- 3 fps
- 4 fps
- 6 fps
- 7.5 fps
- 10 fps
- 15 fps



Selected Rate will display in "Rate Box".

A Check mark will appear next to Rate selected.
The Active Rate will also be displayed in the upper right corner of the Main Image screen.

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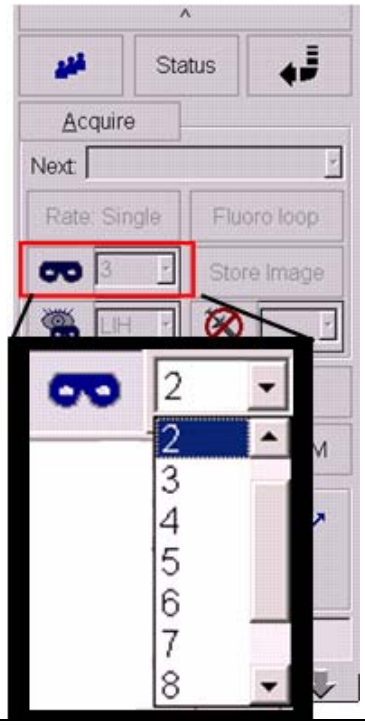
Selectable DSA Mask (DSA Only)



By enabling masked acquisition, the image number, which is used as the mask can also be configured.

Used as Doctor Preference

The default state of the **DSA** button and the default mask number can be configured as a Doctor Preference. The Doctor Preference setting can be overridden using the ***Standard Control Box.***

Using the Standard Control Box

When Photo-spot acquisition mode is selected on the generator, the ***Standard Control Box*** contains a *Mask* button. Click on down arrow (▼) list of frame numbers from which to choose image that will be used as a mask. The default state of these controls is determined by the Doctor Preference settings.

NOTE:
This feature is only available on RF/DSA systems.

Injector Synchronization (DSA Only)

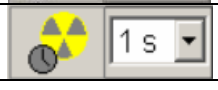
Select the Injector Synchronization feature from the Standard Control Box. Injector Sync does not work when the Rate is set at Single.

There are *Four* modes of *Injector Synchronization*:

- Off
- Injector and Exposure Together
- Injector Leads Exposure (X-Ray delay)
- Exposure Leads Injector (Injector delay)

	Injector Synchronization disabled
	Injector and Exposure at the same time ***NOTE:*** *No time adjustment is available.*

INJECTOR SYNC DELAY SETTING

	Injector Delay enabled
	X-Ray Delay enabled

The delay is specified by a number of whole number

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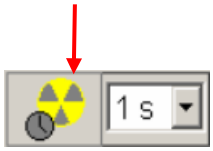
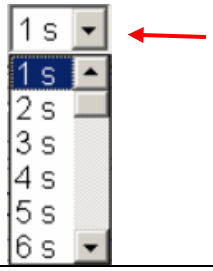
Click to activate button changes.

Continue to left click button until the correct button mode you want displays.





Using *Down Arrow,* select delay time in seconds (from 1-30 seconds in 1 second increments).

The delay is specified by a number of whole number seconds from 0 to 30. The delay begins on the activation of the Ready for RAD Exposure input from the generator.

a. Left click on Injector icon.
b. The button will change to indicate function is active.
c. Click to select Injection Delay Time in seconds.

NOTE:
This feature is only available on DSA systems and must be enabled in the Service Application.

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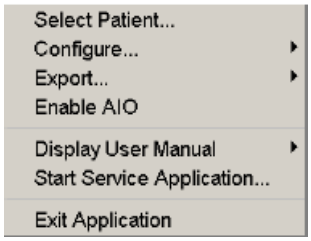
6.4. Programmable Sequences (DSA Only)

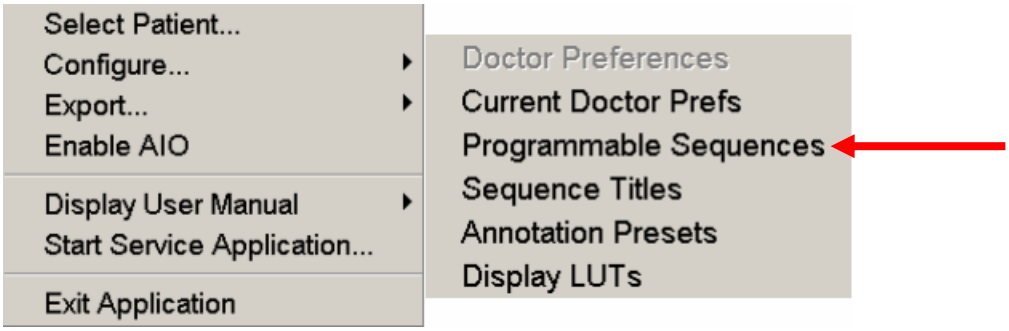
Selecting a Programmable Sequence for image acquisition will automatically control the acquisition rate and the time (in seconds) at which images are acquired. This feature is only available on RF/DSA systems.

6.4.1. Create New Programmable Sequence

1 Right-click while cursor is over the image display area.
The Right Click Menu will be displayed.



2 Position cursor on Configure... button and a second *Sub-menu* will be displayed.



3 Left-Click on Programmable Sequences
4 The *Programmable Sequences* screen will be displayed.
5 Left-Click on the New button.

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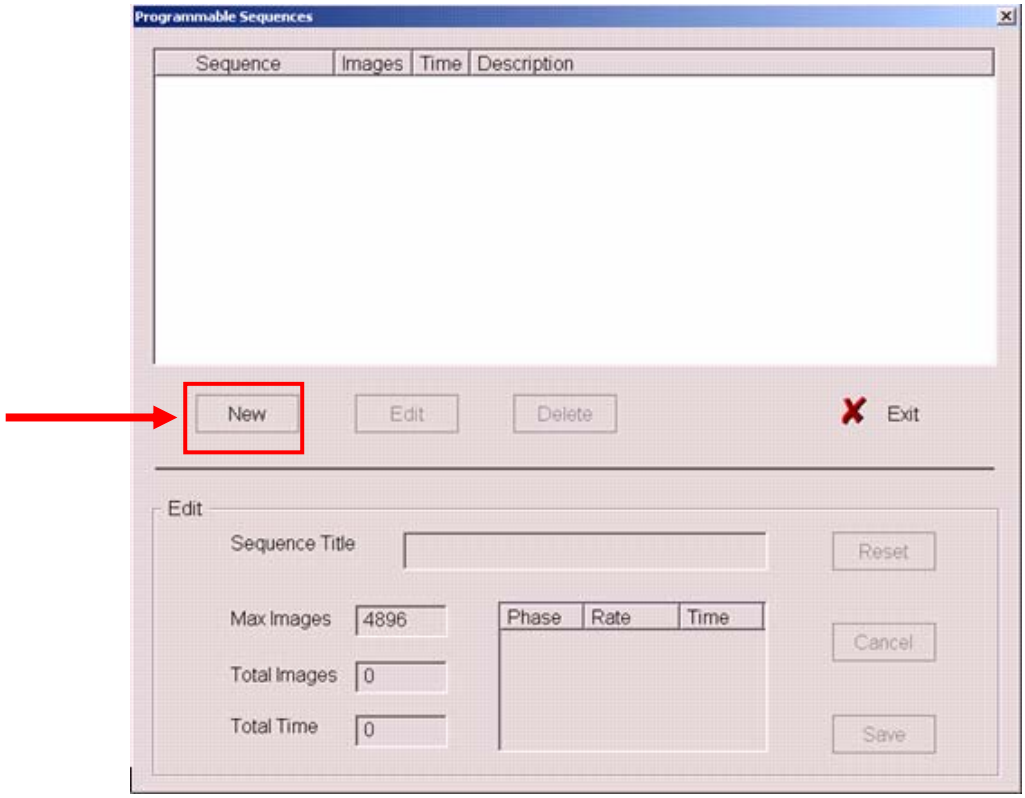
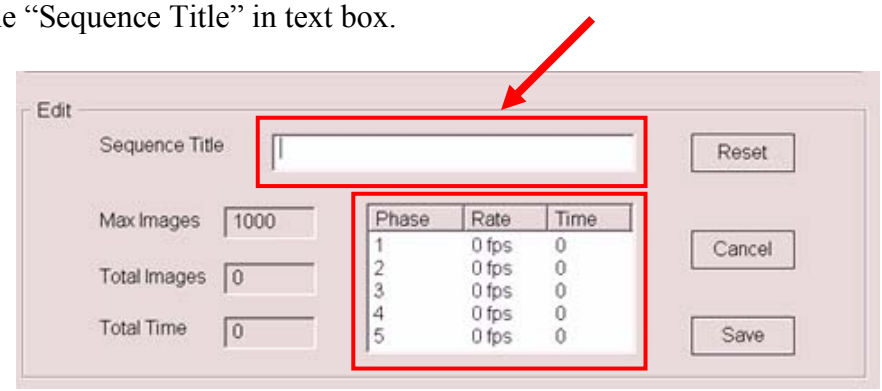
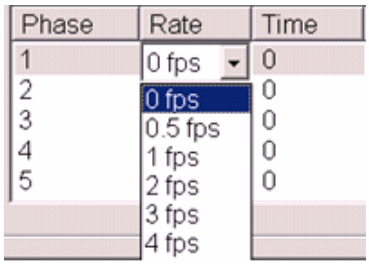


6 Enter the "Sequence Title" in text box.



7 Click on the Phase to be edited.
8 Double-click on "0 fps" in Rate column - in line with the Phase selected.
9 The FPS (frames per second) drop-down menu will be displayed (fps = frames/second). Click on the desired acquisition rate.



10 Click on the 0 in the Time column – in line with the Phase selected.
11 Enter the number of seconds to acquire at the specified rate.

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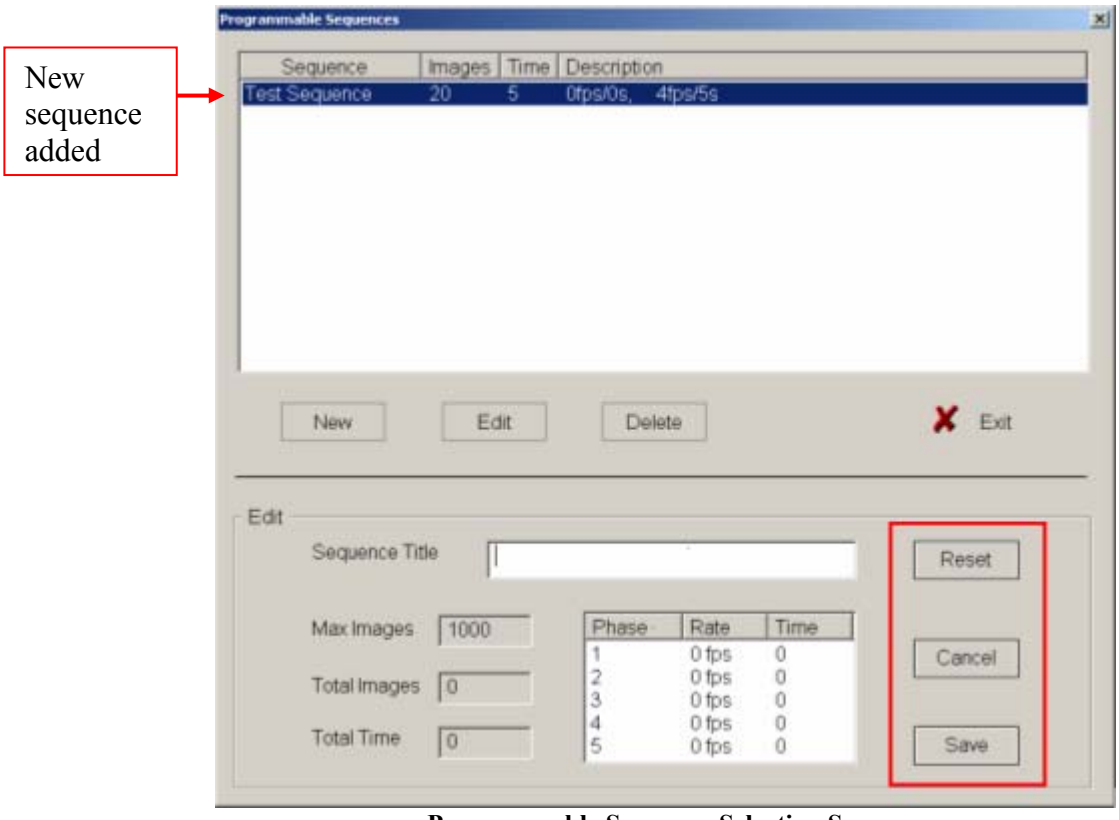
Phase	Rate	Time
1	0.5 fps	10
2	1 fps	10
3	2 fps	0
4	15 fps	0
5	2 fps	0

12 Repeat steps 4-11 to configure as many *Phases* as needed.

13 Click on the *Save* button to save the *Sequence* settings.
Optionally, click on the *Cancel* button at any time to clear the current settings.

14 After the *Save* button is clicked, the *Programmable Sequences* window displays with the new *Sequence* added to the list.



Programmable Sequence Selection Screen

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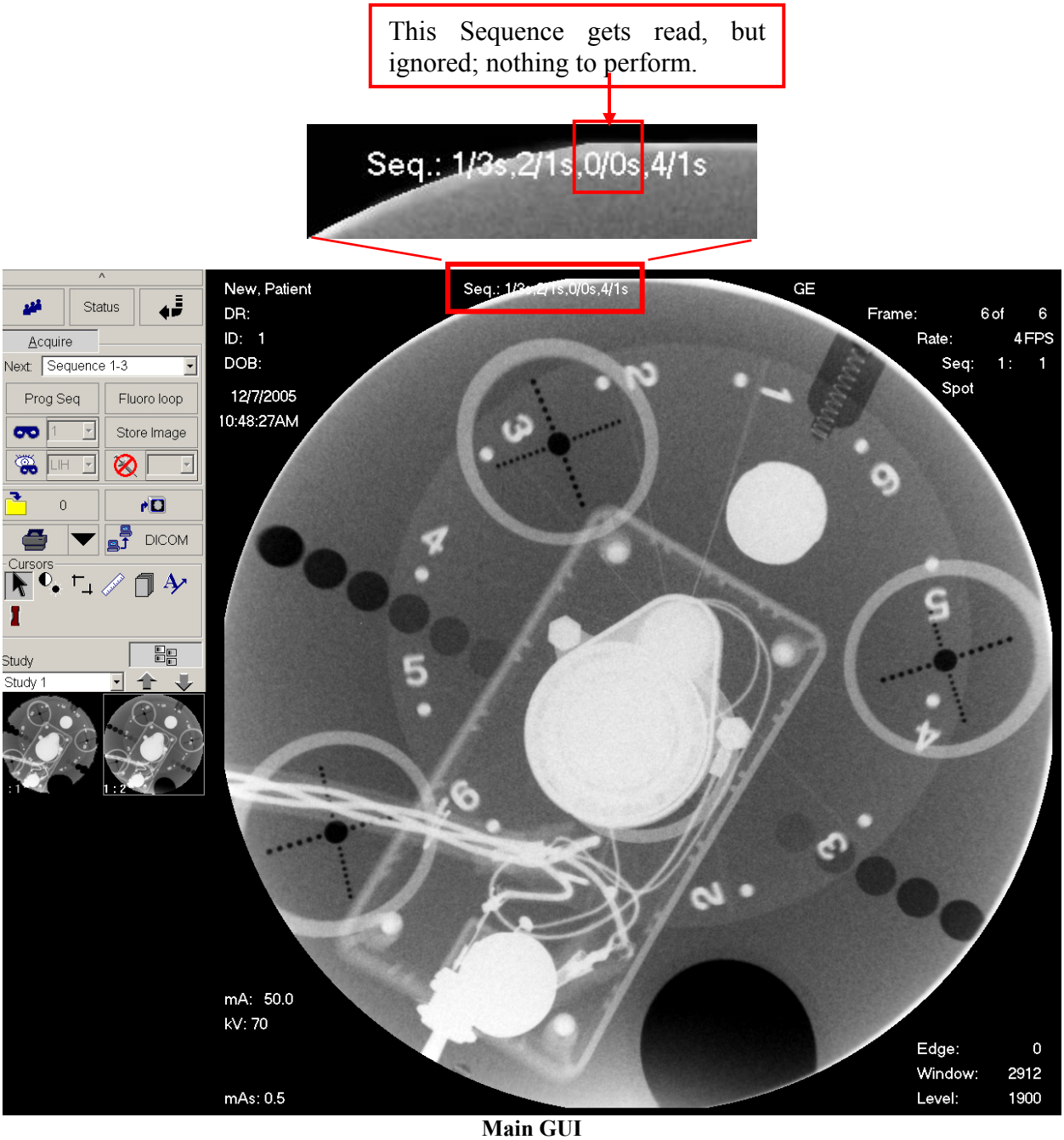
Rates of 0 fps with *Time* of 0 are essentially skipped when running the *Sequence.* A screen notation of the *Sequences* run will display at the top center of the *Display Area.* This notation shows that only *Sequences* 1, 2 and 4 were executed.



Main GUI

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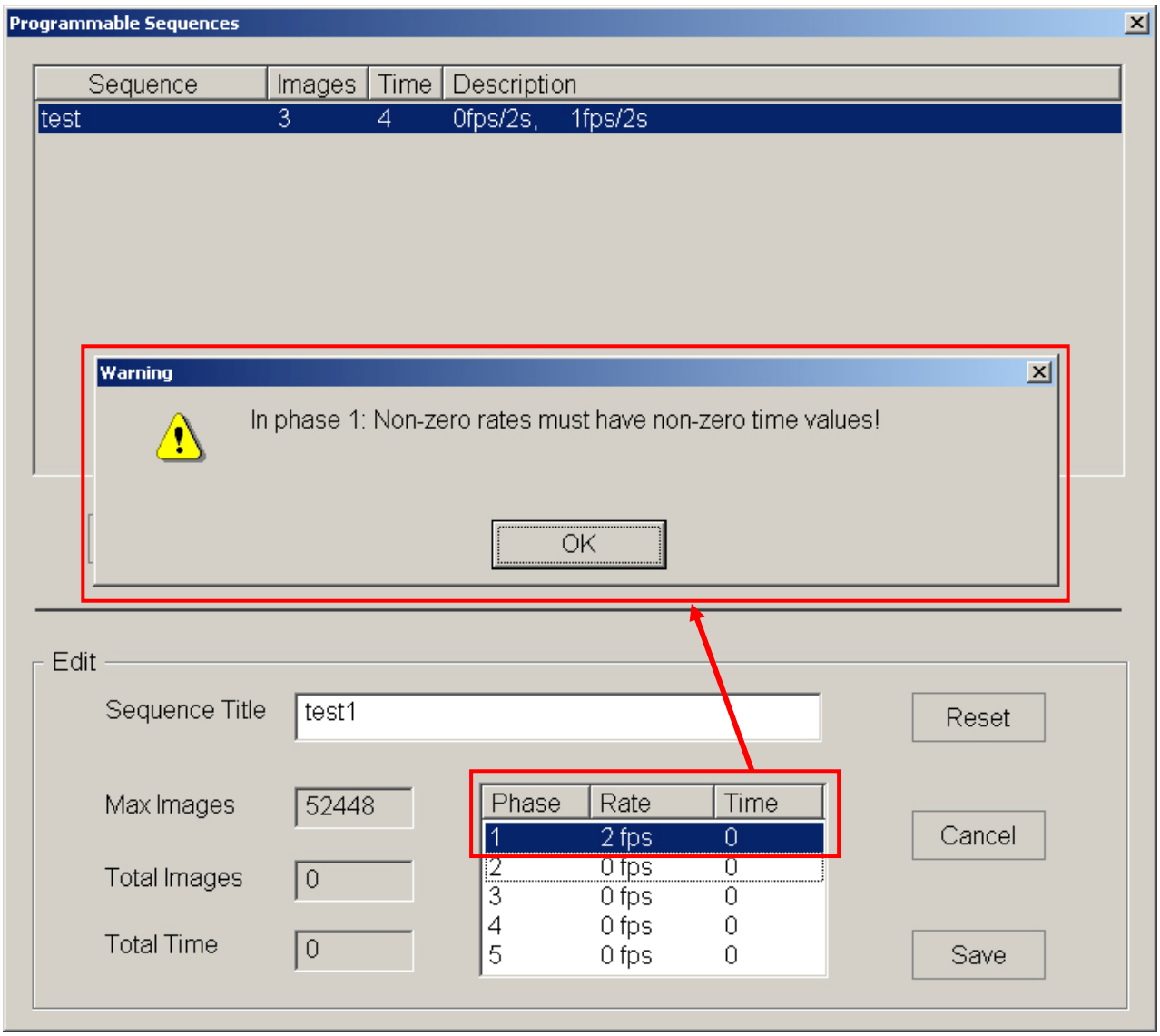

Programmable Sequences Screen with a Pop-up Warning Message Displayed

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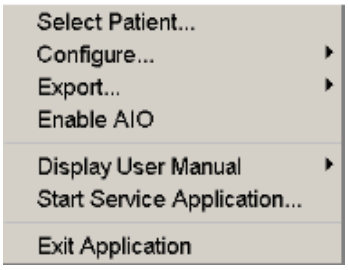
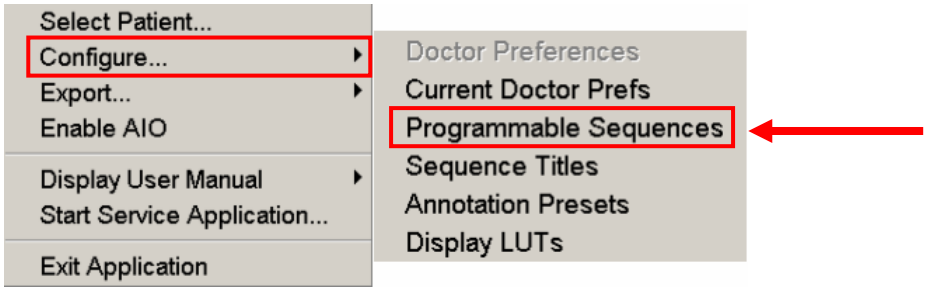
6.4.2. Edit Existing Programmable Sequence

1 **Right**-click with cursor over the image display area. The **Right-Click Menu** will be displayed.



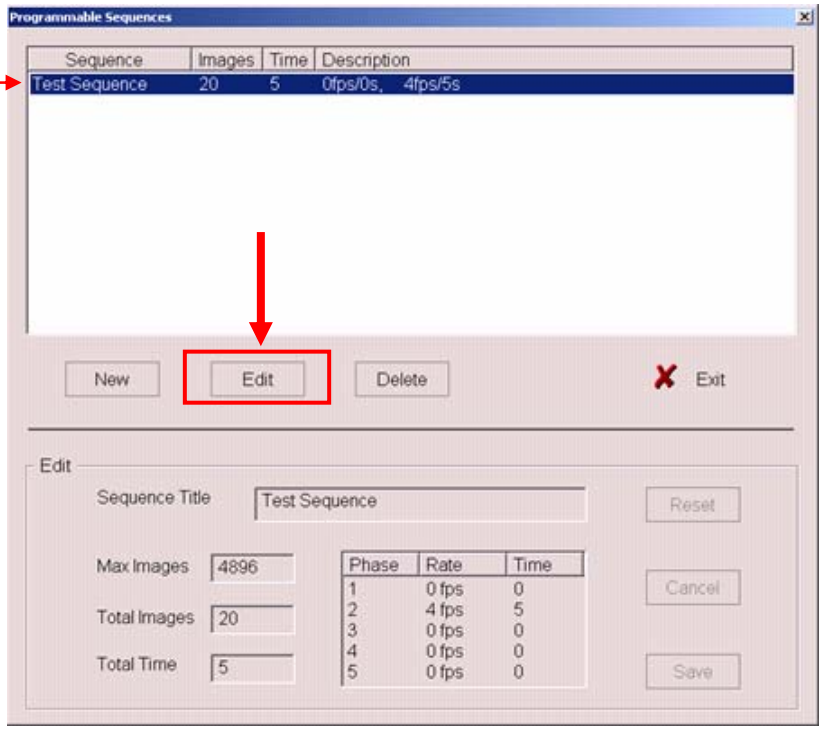
2 Position cursor on Configure... button and a second sub-menu will be displayed.



3 Left-Click on Programmable Sequences.

4 The *Programmable Sequences* screen will be displayed.

Current settings for highlighted sequence.



5 Left click on the sequence to be edited.

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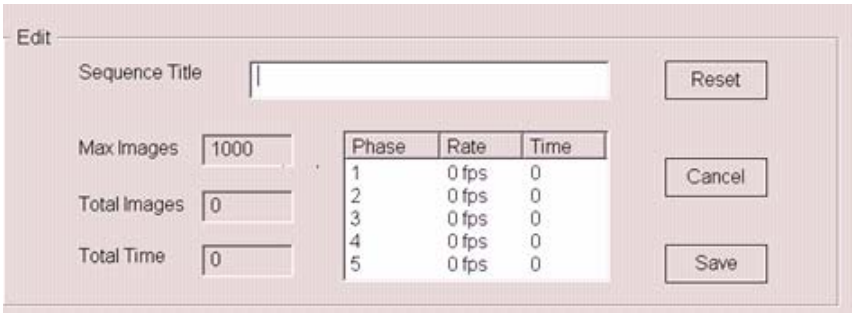
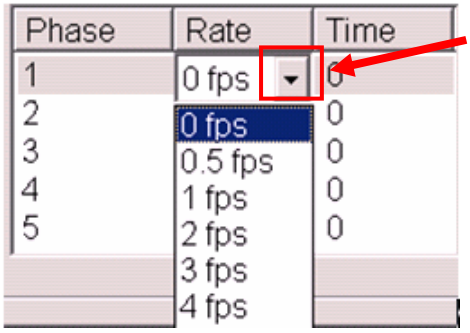
6 Left click on the **Edit** button. The ***Edit Programmable Sequence*** window is enabled.

NOTE:
The sequence can be deleted by highlighting and clicking on the Delete *button.*

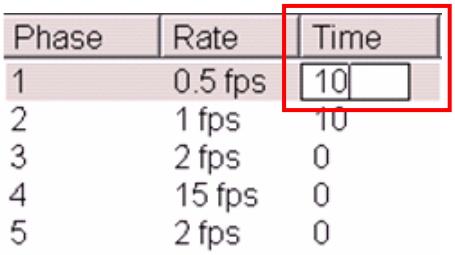


Edit Programmable Sequence Screen

7 Edit the **Sequence Title** if necessary.
8 Double left click on the **Rate** drop-down list to change the acquisition rate for any phase.



9 Enter the number of seconds to acquire in the Time box.



NOTE:
Click on the Reset button at any time to clear all the settings

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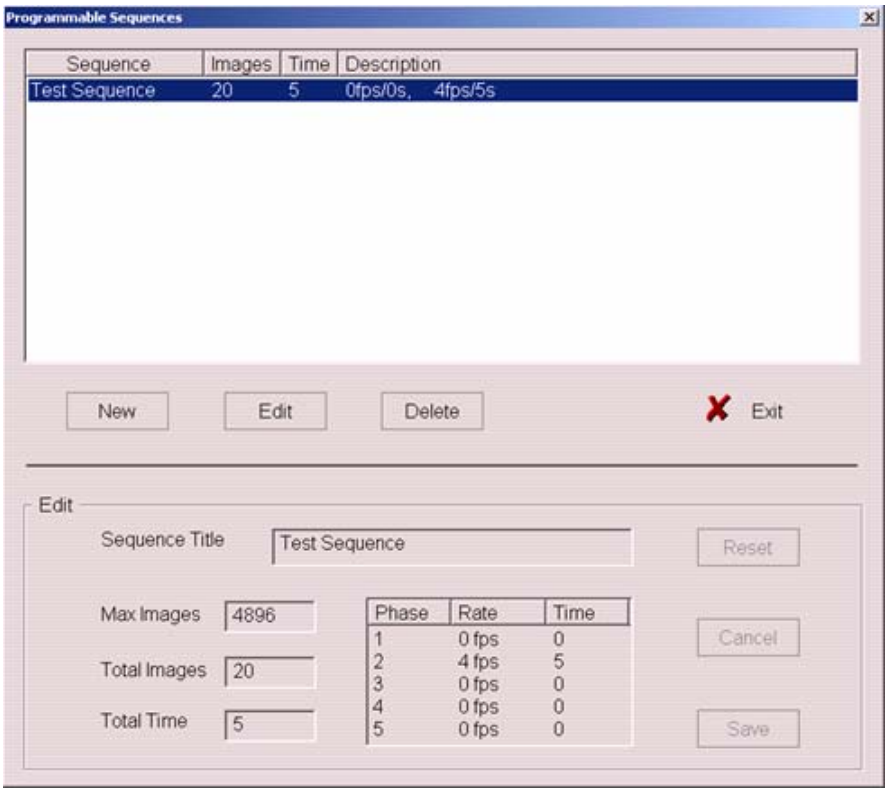
10 Click on the **Save** button to save the sequence settings.

11 The ***Edit Programmable Sequence*** menu is closed, and the ***Programmable Sequences*** window is updated with the new Sequence added to the list.



6.5. Edge Enhancement Feature

Use the Edge Enhancement feature to enhance an area with large differences in contrast. It increases the spatial resolution of an image display often increasing the visibility of image detail. There are five levels of Edge Enhancement (None, Level 1, 2, 3, 4). Low-pass Edge Enhancement adds a finer level of detail. When the Low-pass filter is activated, it replaces one of the four levels normally available.

As images are acquired the system will apply the Edge Enhancement setting selected in the *Doctor Preferences* feature. To adjust the Edge Enhancement setting for the next acquire fluoro image without adjusting Doctor Preferences:

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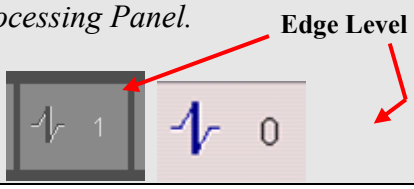
1 Hide the *Tool Panel* by clicking on the ^ button at the top of the *Standard Control* box.

2 A "ghost" panel will replace the Control Area Panel(s).

3 Click on the *Edge Enhancement* button that appears at the bottom of the *Hidden Panel*.

NOTE:
The "Edge Enhancement" button is identical to the "Edge Enhancement" button on Expanded Control box and located at the Lower Processing Panel.



4 Click to increase *Level* to be applied to next acquired image.

Edge Enhancement applied during *Fluoro Acquisition* temporarily changes the *Default Edge Level* set in *Doctor Preferences*. When that image is reviewed, the applied *Edge Level* will be carried over and the button on the Processing screen will reflect that level.

Changes to the *Image Processing Edge* button will be carried with the *Reviewed* image. Changes to the *Image Processing Edge Level* will NOT change the *Acquired Edge Levels*.

Use the Restore button to get back to the main GUI

In all other instances, the *Edge Enhancement* button on the *Image Processing GUI* will show the level set in *Doctor Preferences*.

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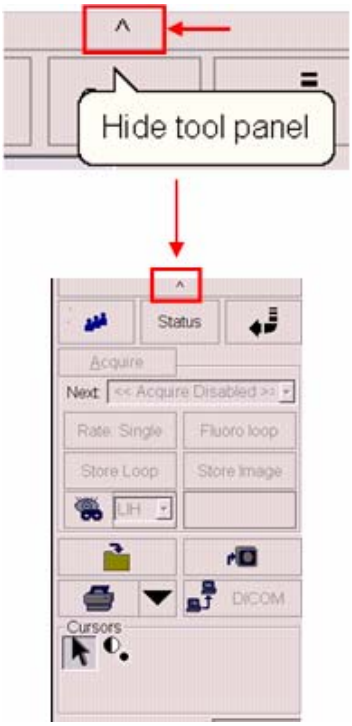
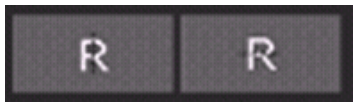
6.6. H & V Reverse (Horizontal & Vertical)

Use *H/V Reverse* for image reversal during L*ive Fluoro*. *H&V Reverse* allows the acquired image to be reversed in the Horizontal direction, the Vertical direction or both directions as they are acquired.

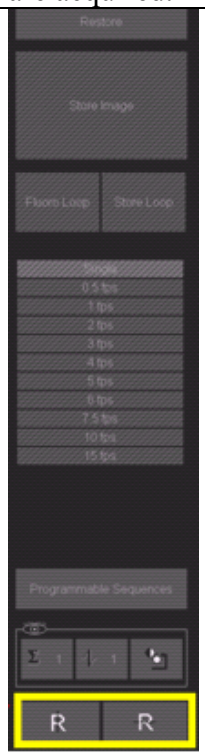


Hide Tool Panel – Located at the top of the *Standard Control* box, click *Arrow* (^) to eliminate the *Tool Panel Display* from the screen.

The *"H/V Reverse"* buttons on the *GUI Shutter* can be used to reverse *Fluoro* image orientation during live *Fluoroscopy* or for the next image acquired.

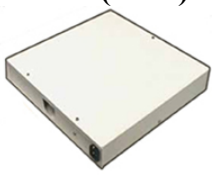


Reverse Buttons



GUI Shutter

Generator Interface Module (GIM)



The GIM is an external, independent operating device that manages all communications to and from the host x-ray system.

The GIM interface for *H & V Reverse* allows for the use of *Tableside Controls* to control the orientation of the displayed image. These controls are connected to the *Two-state Inputs* of the GIM. Current may flow either way through the input circuit. Each of the *Two-state Input Signals* has a companion *LED Status Indicator* on the GIM board showing the *Current Status (On or Off)* of each input signal from the generator.

NOTE:
The H&V Reverse control must be Enabled in the Service Application.

Use of this interface will make the Doctor Preferences interface and GUI Shutter Interface unavailable.

Doctor Preferences

The *Doctor Preferences* interface for *H&V Reverse* allows the image orientation to be configured according to the normal work patterns of a particular doctor.
The orientation specified in the *Preferences* may be overridden with the *GUI Shutter* interface.

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6.7. Mag Modes

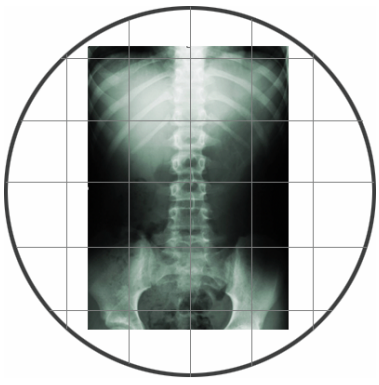
X-ray systems utilize an image intensifier will have *MAG* or *Field of View (FOV)* selection controls. Most systems have three *FOV* settings, with some having four. These settings provide a close-up of anatomical regions.

INPUT / FIELD OF VIEW TYPE	APERTURE	TYPICAL USAGE and DOSE	TYPICAL DOSAGE
Normal (MAG 0)	*12 inch*	*Wide open; Panning; Localization of area of interest*	*LEAST*
MAG 1	*9 inch*	*Typical studies run here to see smaller items close-up*	*MORE*
MAG 2	*6 inch*	*Even closer; can see intestinal polyps*	*MORE*
MAG 3	*4.5 inch*	*Super close-up required of small area in adult; Smallest pathology; and pediatrics*	*MOST, but possible to reduce for child*

MAG Modes Chart

The *Precision RXi* configuration has *MAG FOV* inputs to finely compensate for the available light due to the *Generator, Auto Exposure Control,* and *Intensifier Response.* Configuration can be done through the *Service Application Configuration Screen*.

Image Examples for Different MAG Modes and Uses



NORMAL (12”) Panning; Localization of image area and for Upper and Lower GIs	1 X-ray Run at 9” and study run at 6”; here at 9” MAG 1 AND MAG 2) Close-up images	(4.5”) For smallest pathology; and pediatrics

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6.7.1. Mag Mode Diagram

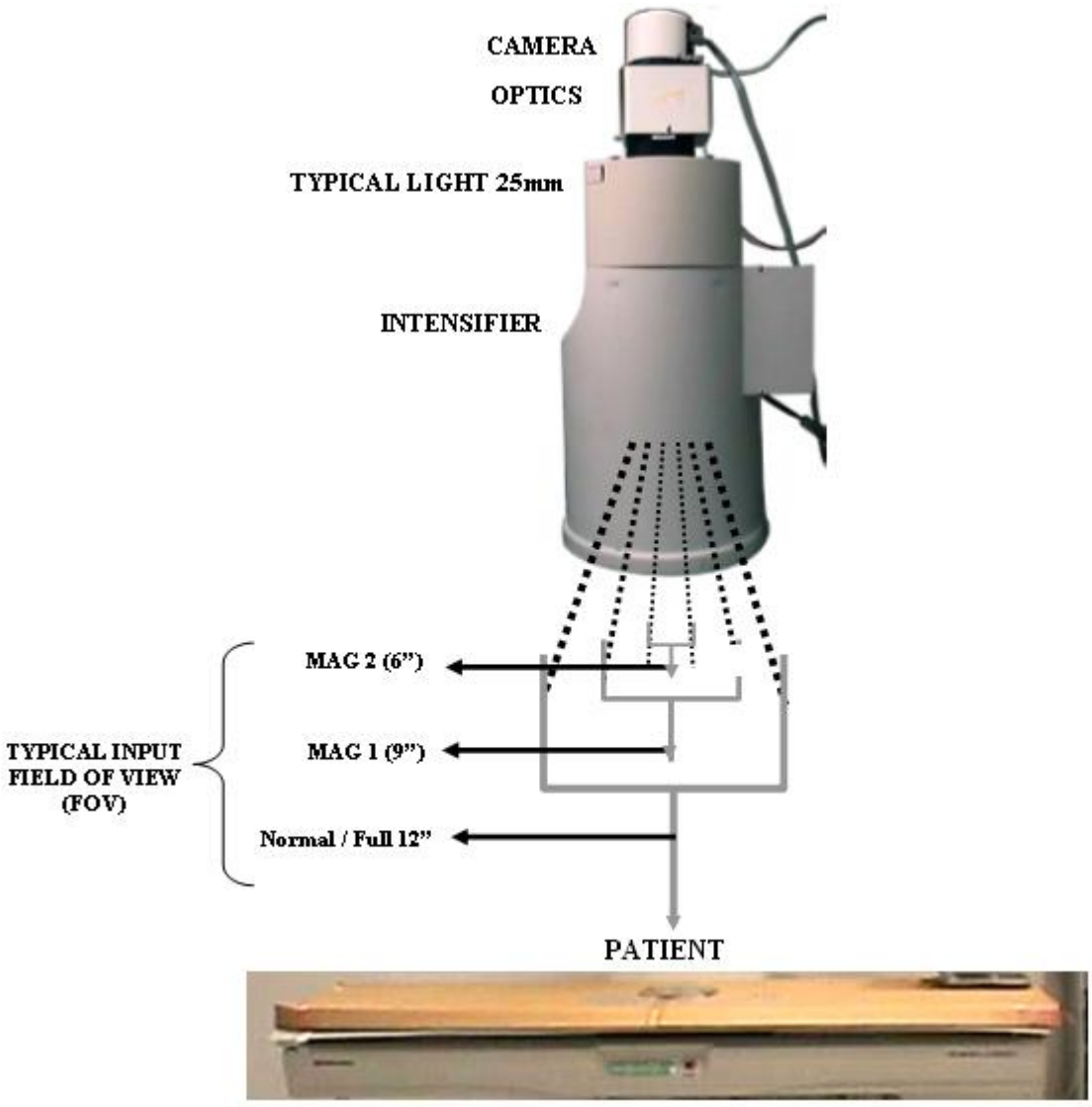

Table with X-Ray Tube Below

Configuration of MAG Modes can be done through the Precision RXi Service Application Configuration Screen.

> ***NOTE***:
> *Additional information on this topic is beyond the scope of this manual. See your Service Applications Administrator.*

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6.8. Fluoro Noise Reduction

The **Precision RXi** utilizes three (3) recursive Integration Levels and five (5) levels of Motion Correction: Int1 through Int 8 (MCx) (see next page for illustration).
The Fluoro Noise Reduction setting is selected as a Doctor Preference setting or on the Acquire Screen Toolbar.

6.8.1. Frame Integration

The Frame Integration feature is provided to reduce Signal Noise (SN or S/N) in Fluoroscopy image frames. It operates on the acquisition frame by combining/averaging previous frames in the selected manner to achieve Noise Reduction. Integration Settings are not adjustable for images after they are acquired.

6.8.2. Motion Detection

Motion Detection Measures the change in *Contrast* from one frame to the next. Based on the amount of change in *Contrast,* the amount of *Integration* will decrease. A large change will decrease the amount of *Integration* and vice versa.

6.8.3. Motion-Corrected Frames

There is one significant drawback to using multiple frames to reduce Noise and generate a single image – images with significant amounts of movement exhibit Lag and Smearing in the changing areas of the image. For 2-, 4-, or 8-Frame Recursive Integration Options, the Movement-Lag effect increases with the number of frames being integrated. To overcome this effect, it is necessary for the Integration Logic to detect and adjust for movement in the image. The Motion-Corrected Frame Integration options address this issue. There are five (5) available levels of Motion-Corrected Frame Integration available in the Precision RXi: Int4, Int5, Int6, Int7, and Int8.

6.8.4. Recommendations for Noise Reduction

Select an optimal Motion Correction (MC) Filter based on the Fluoro Pulse Rate used, over just using the standard Interface Filter

This practice will greatly improve image quality.
Each MC Filter selection is designed for different pulse rates.

Noise-reduced Image Sequences can be obtained by using:

- Recursive Filtering for Temporal Noise Suppression
- Motion Correction for avoidance of Motion Artifacts

6.8.5. Recursive Options/Levels for Frame Integration

Non-Recursive Integration: This option uses the last acquired frame to combine with the current frame to provide Noise Reduction. Available Noise-Reduction is minimal.
Recursive Integration Levels (Real-time Noise Reduction): The 2-, 4-, and 8-Frame options are simply based on combining 2, 4, or 8 previous frames to provide Noise Reduction; resulting in a processed (integrated) frame. The following settings offer Motion Corrected Recursive Integration Levels at different pulse rates. The available Noise-Reduction increases with the number of frames being integrated.

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6.8.6. Available Noise Reduction Integration Settings

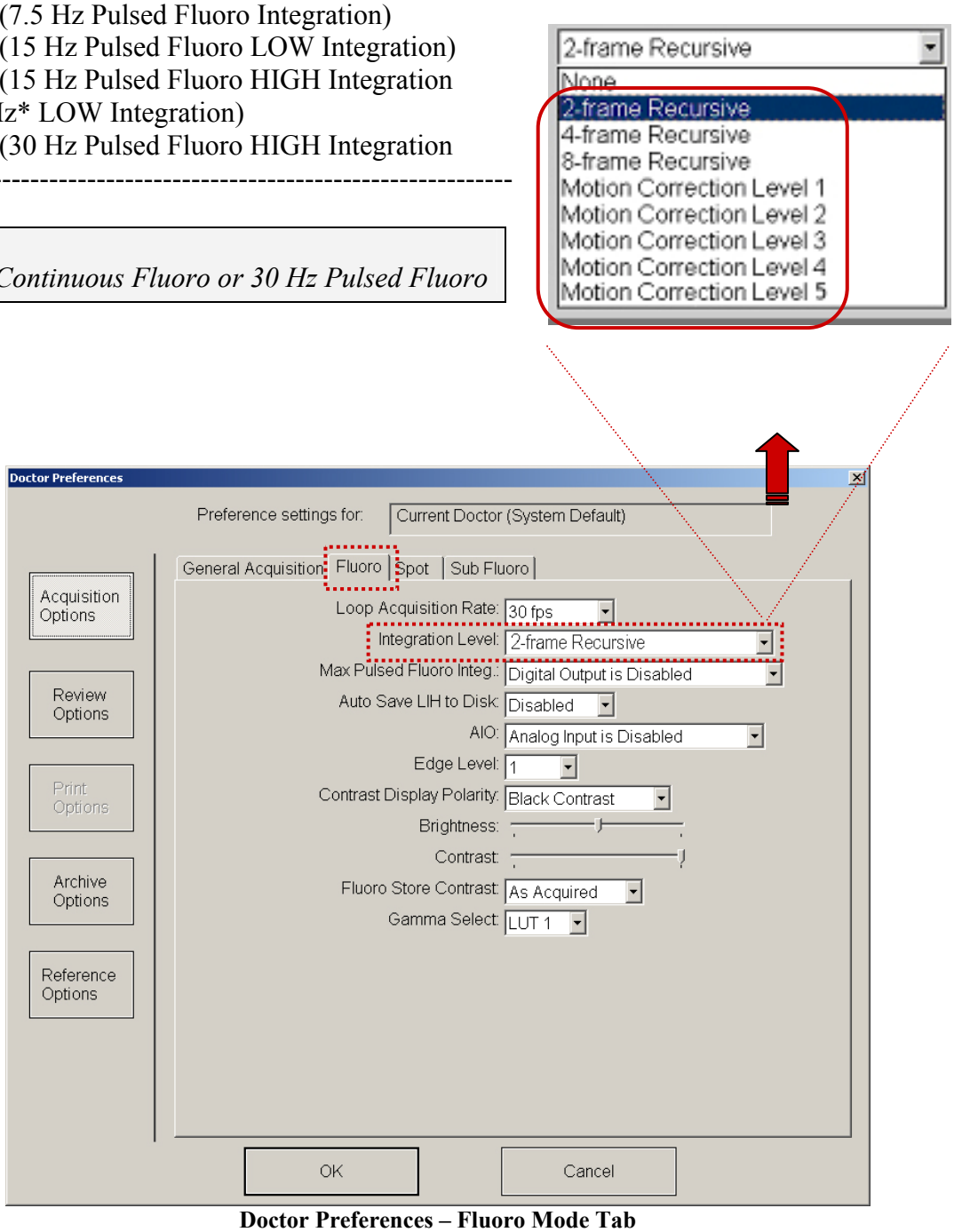
Select the desired Level of Integration before applying radiation since the Level of Filtering reflects the amount of noise reduction during the real-time display, thus affecting the resolution of the stored image.

The Integration Setting is not adjustable for images after they are acquired.

Int 1 = 2-Frame Recursive
Int 2 = 4-Frame Recursive (estimate)
Int 3 = 8-Frame Recursive (estimate)

Int 4 = MC1 (3.75 Hz Pulsed Fluoro Integration)
Int 5 = MC2 (7.5 Hz Pulsed Fluoro Integration)
Int 6 = MC3 (15 Hz Pulsed Fluoro LOW Integration)
Int 7 = MC4 (15 Hz Pulsed Fluoro HIGH Integration
or 30 Hz* LOW Integration)
Int 8 = MC5 (30 Hz Pulsed Fluoro HIGH Integration

NOTE:
**30 Hz = Continuous Fluoro or 30 Hz Pulsed Fluoro*



Doctor Preferences – Fluoro Mode Tab

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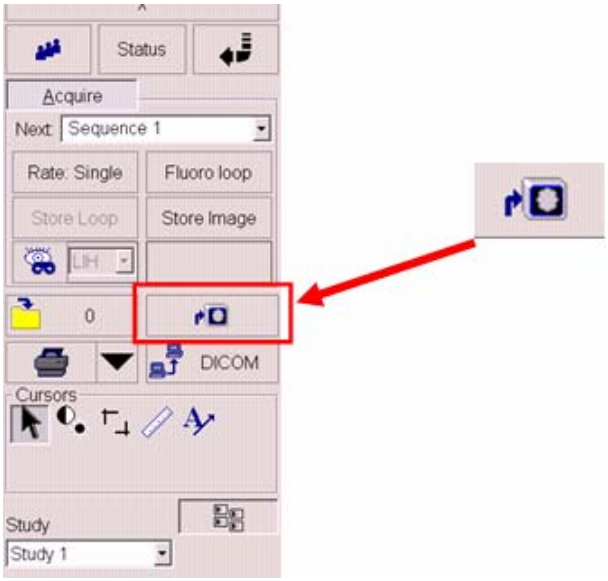
6.9. Reference ImageReference Image Display

Up to fourteen (14) images may be stored as Reference images in the Thumbnail list.
Additional stored images may also be sent to the Reference Display from the Primary Display's Thumbnail window, but those images will then overwrite the oldest thumbnail position.
The Reference Image Thumbnails will operate in a queue fashion; the oldest Reference image will be replaced when queue is full.

Configuration can be done through the Precision RXi Service Application Configuration Screen.

NOTE:
Additional information on this topic is beyond the scope of this manual. See your Service Applications Administrator.

6.9.1. Save Image to Reference

Manual Save	There are three ways to save an image displayed on the Primary Display to the Reference Image Display. • Use the "Create Reference Image" button in the Standard Control Box.  For Multi-image Display scenarios, the "Create Reference Image" button would operate on the image currently selected with the Image Selector Box.

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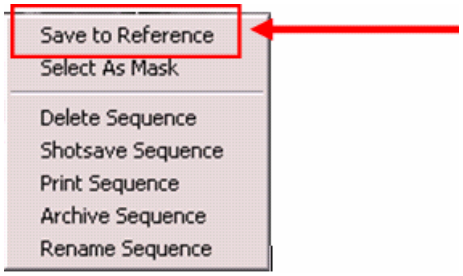
	• An image that is already stored to the local database may be moved to the Reference Image Display, by right clicking on the thumbnail and selecting "Save to Reference".  • Alternately, use the F9 key to save the current image to Reference Display. ***NOTE:*** *Save to Reference will send the image represented by the thumbnail to the Reference Image Display.*
Auto LIH to Reference	The Auto LIH to Reference feature will automatically transfer each LIH image to the Reference Display when the next acquisition begins. This feature will be configured as a Doctor Preferences.

6.10. Acquisition Last Image Hold (LIH)

Last Image Hold (LIH) allows the last image displayed on the image screen to be saved or stored to the local database.

NOTE:
Any time that fluoro radiation is active and system is not set to acquire, live fluoro is displayed. The last complete image frame will become the new LIH image when fluoro radiation is terminated.

6.10.1. Store Fluoro LIH to Local Database

This feature provides the capability to selectively store LIH images to the system's database. A thumbnail will be created for each image stored.

1 Click the **Store Image** button in the Standard Control Box.
2 The LIH image is transferred to the local database.
3 A thumbnail for this image is added to the end of the list for the current study.

Fluoro images can be automatically stored by enabling the *Auto Save LIH* to disk option in *Fluoro Doctor Preferences* dialog.

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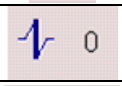
6.10.2. LIH Features

The following features can be applied to the Last Image Hold image.

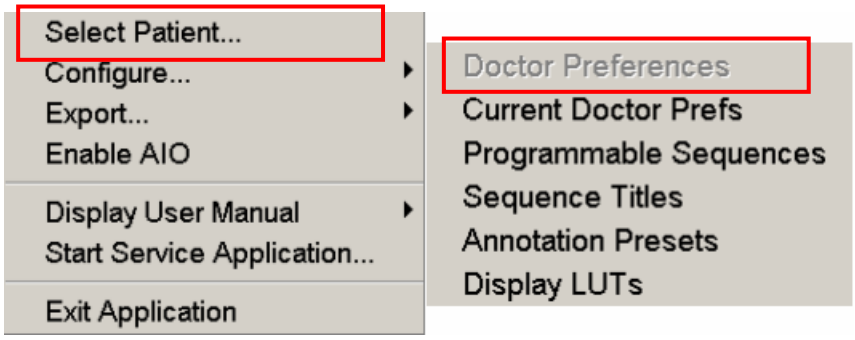
Adjust Image Contrast (Window)	Use Brightness/Contrast cursor	
Adjust Image Brightness (Level)	Use Brightness/Contrast cursor	
Invert the Gray Scale (invert)	Use Invert button on Expanded Control Menu	
Fluoro LIH Edge Enhancement	Use Edge Enhancement button	
Reference Image Display	Use the Save to Reference Image button on the Standard Control box.	
Zoom	Single click the Zoom icon to enlarge the image. To disable Zoom function, single click Zoom icon.	

6.11. Auto Acquisition Replay

This feature is set on the Doctor Preference – **General Acquisition** menu. Acquired sequences will automatically replay on the Control Room Monitor at the acquisition rate.

To temporarily change the default behavior:

1 Right-click in the image. Menu will appear.
2 Position the cursor on *Configure*, and then click on *Current Doctor Prefs*
3 Make selections from Doctor Preference set-up screen.
4 This function allows the temporary modification of any of the Doctor Preference fields for the current patient/doctor.



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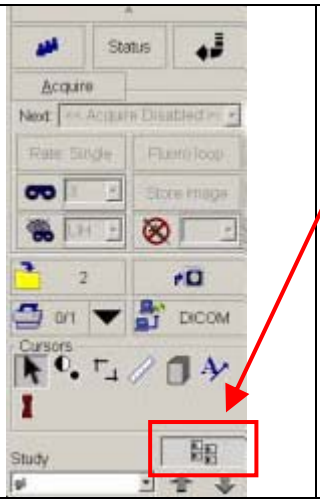
7. Reviewing Images

7.1. Sequence selection

After patient images have been acquired, the images can be *Reviewed* and *Image Processing* may be applied. *Processing Features* selected can only apply to the image currently displayed in the *Main Image* screen.
Applied *Processing Features* will be saved to the database when they are applied. When images are sent to a *DICOM Printer Device*, the *Processing Features* will also be applied to the image.

7.1.1. Displaying Expanded Control Box

Prior to the application of Processing Features, an image must be selected. Image Processing Feature buttons are located on the Expanded Control Box, or Lower Processing Panel.



Click to display Expanded Control Box and turn off thumbnail

- The Expanded Control Box will be displayed directly underneath the Standard Control box and covering the area where the thumbnails appear.
- To restore Thumbnails to the screen, click on

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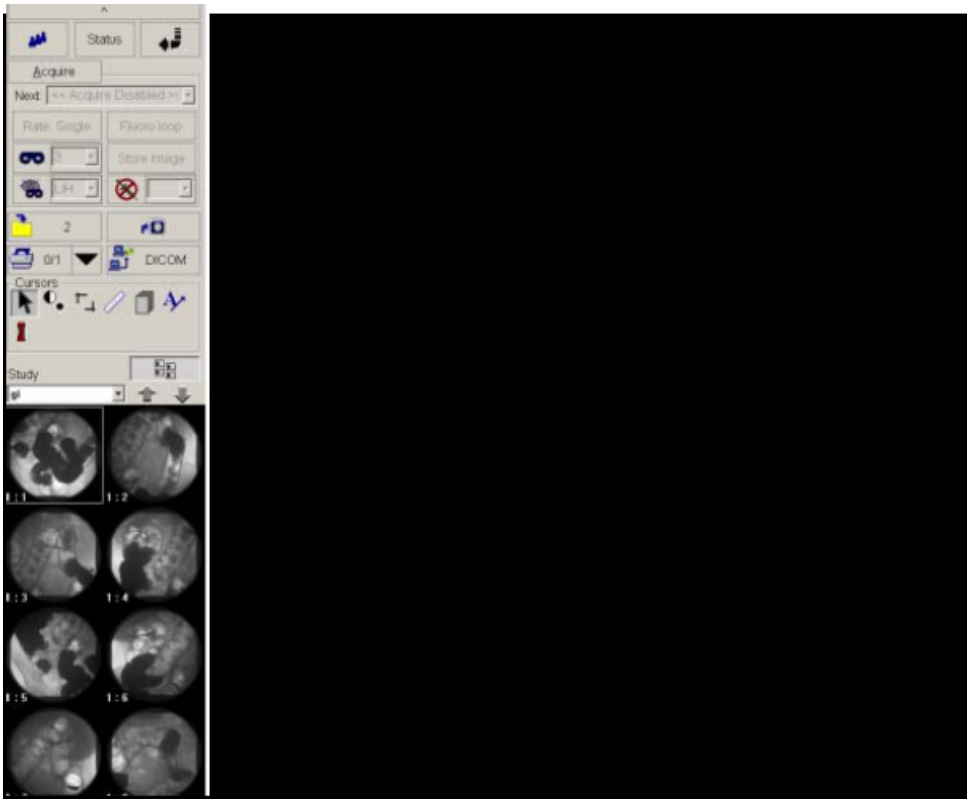
7.1.2. Thumbnail Display

The Control Room Display monitor contains thumbnails whenever a patient file is open for *Review* or *Acquire*. A thumbnail image for each sequence in a study is displayed on the left-hand side of the Control Monitor as shown in the figure that follows:



Control Room Display with Thumbnails

To show more thumbnails, click on the down arrow ( ) on the **Standard Control box.**

7.1.3. Select an Image

To select an image or sequence from the *Thumbnails*, left Click on a thumbnail with the mouse or in-room pointing device to display that image or sequence in the Image Display Area.

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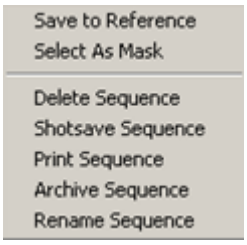
7.1.4. Thumbnail Right Click Menu

Any time that thumbnails are displayed on the **Main Image** screen, a series of related functions can be accessed through the **Thumbnail Right Click Menu.** Move the cursor over the thumbnail representing the sequence to be processed and right click.



Select	Functions
Save to Reference	Saves on-screen thumbnail image to reference monitor.
Select As Mask	NOT currently implemented.
Delete Sequence	Deletes selected sequence. All images in deleted sequence are marked with a "**D**". The thumbnail is also marked with a "D". The sequence will be deleted when the patient file is closed. Prior to the sequence being deleted, a warning box will appear asking for confirmation of the action. Make applicable selection from window and proceed.
Shotsave Sequence	Click to ShotSave the entire sequence into ShotSave folder as a single thumbnail.
Print Sequence	Click to Print sequence. Reference Chapter Archiving and Retrieving images.
Archive Sequence	Click to Archive sequence.
Rename Sequence	Click to Rename sequence.

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7.2. Sequence Replay

The image processing settings for replayed sequences are selected based on the configuration of the Doctor Preferences.
Doctor Preferences can be set to either the acquisition settings or the last viewed settings.
For DSA and Roadmap sequences, the image processing settings include subtraction and mask frame.

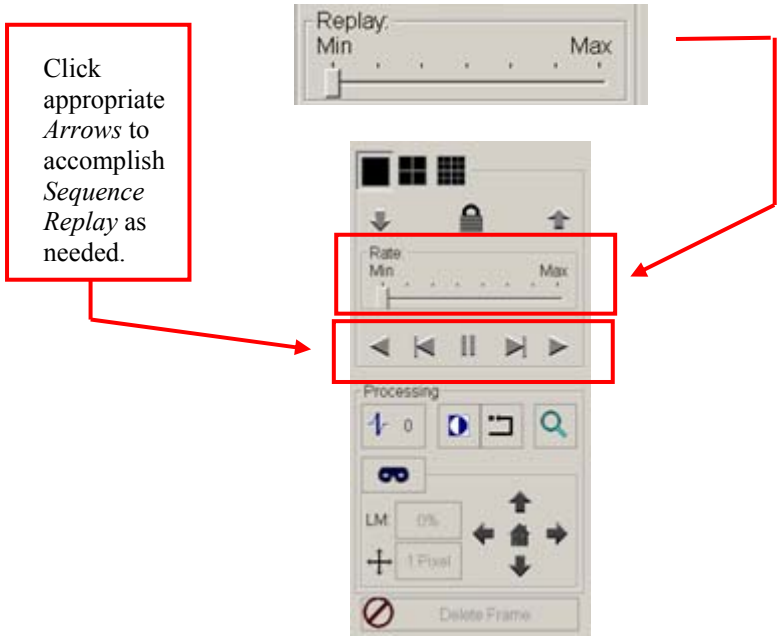
7.2.1. Using the Control Room Mouse

The *Expanded Control Box* contains controls for selecting *Sequence Replay* features including:

From Left to Right:

- Replay Reverse
- Frame Reverse
- Replay Pause
- Frame Forward
- Replay Forward
- Replay Rate (see below)

Slider Control accesses Replay Rate.



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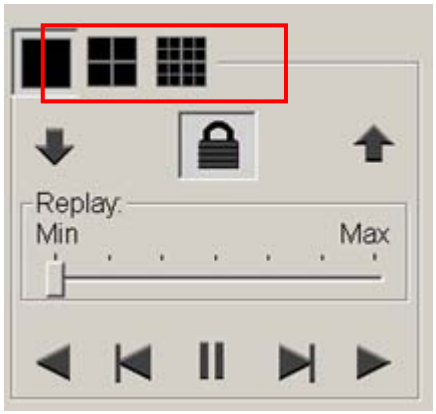
7.3. Display Format

The display format discussed in this section only applies to the screen of the Primary Display monitor. The available display formats are:

- 1-on-1
- 4-on-1
- 16-on-1

The default display format is 1-on-1. Each time a new exam is opened, this will be the display format used.
Display formats are selected from the Display Format box located in the Expanded Control Box, (Lower Processing Panel).



	Set Full Screen Display For 1-on-1
	Set 2X2 Multiple Image display for 4-on-1
	Set 4X4 Multiple Image display for 16-on-1

- Click on any image frame in main image display mode to select it. It will then be bordered with the MID Cursor.
- Double-click on any frame in the main image display mode to display it in the 1-on-1-display format

NOTE:
The following functions can be applied in 4-on-1 or 16-on-1 display format:

- *Expose to hardcopy*
- *Drag to Stacking window*
- *Delete Frame*
- *Mark for ShotSave™*
- *Save to Reference*
- *Loop Lock*

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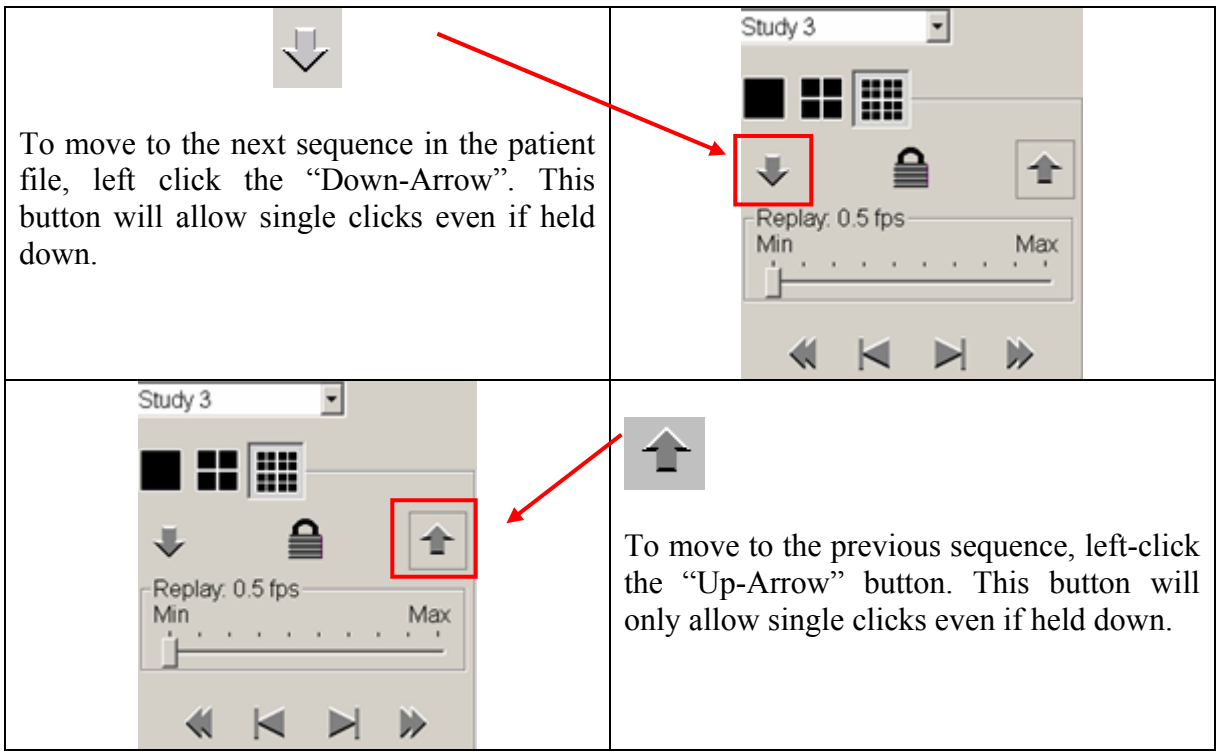
7.3.1. Changing sequence



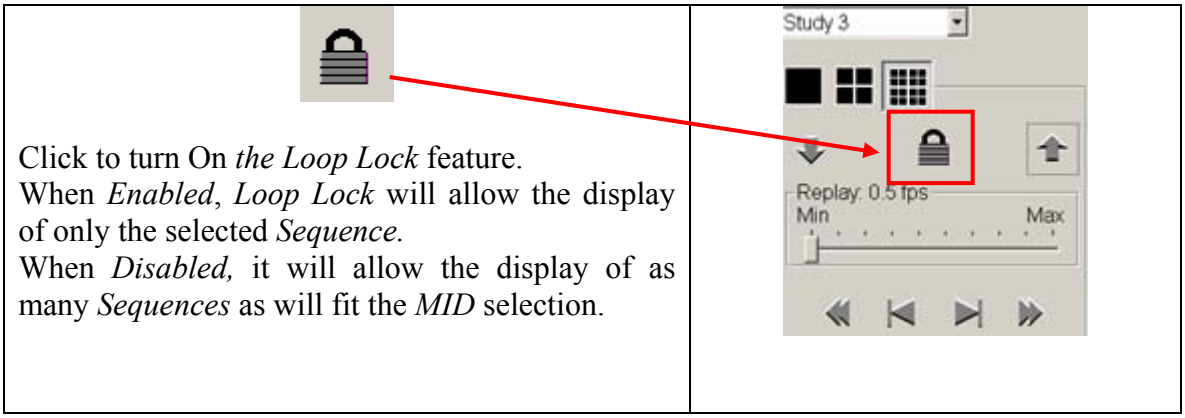
To move to the next sequence in the patient file, left click the "Down-Arrow". This button will allow single clicks even if held down.

To move to the previous sequence, left-click the "Up-Arrow" button. This button will only allow single clicks even if held down.

This function works in all three display modes.

- If there are less than sixteen (16) images, all of the images will appear in the display area at the same time. Clicking on the arrow will bring up the first image in the next sequence.
- If there are more than sixteen (16) images in the 16:1 mode, clicking on the arrow will bring up another page of images if the next sequence is not displayed on the current page.

7.3.2. Loop Lock



Click to turn On *the Loop Lock* feature.
When *Enabled*, *Loop Lock* will allow the display of only the selected *Sequence.*
When *Disabled,* it will allow the display of as many *Sequences* as will fit the *MID* selection.

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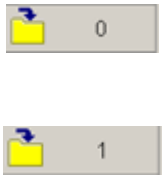
7.4. ShotSave™

During image review, the current image can be saved to a separate file called a *ShotSave*™ file. Images can be marked as **ShotSave™** images in order to create a sub-set of images within a patient file for convenient review, printing or transfer.

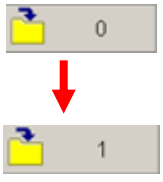
ShotSave™ images remain as part of the *Patient File* and are not deleted or moved from their original storage spot within the file.

ShotSave™ images maintain any processing settings applied. Images can be marked for *ShotSave*™ in one of three ways.

Using ShotSave Button

1. Click on the "ShotSave" button	
2. The current on-screen image will be saved to the ShotSave™ Folder.	
3. The number on the ShotSave Folder button will increase to reflect the addition of the new sequence. The image representing the sequence will be marked with an "S" in the lower right corner of the thumbnail and in the lower left corner of the image on the main image screen.	

From Thumbnails:

1. Right click on the desired Thumbnail. The Thumbnail Right Click Menu is displayed.	
2. Select ShotSave Sequence.	
The selected sequence will be saved to the ShotSave folder and the number on the ShotSave Folder button will increase to reflect the addition of the new sequence. The image representing the sequence will be marked with an "**S**" in the lower right corner of the thumbnail and all frames in the sequence will be marked with an "**S**" in the lower right corner of the image on the main image screen.	

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7.4.1. Using ShotSave Cursor

When a sequence is opened for Review in 4on1 or 16on1, the *ShotSave™* cursor will appear in the *Cursor Tool* bar.

1. Single click on the cursor. Cursor becomes "Active"
2. Move ShotSave cursor over image representing the sequence that to be saved to the ShotSave™ folder and double click.
3. The image will be saved to the ShotSave™ folder and the number on the ShotSave Folder button will increase to reflect the addition of the new image.

The image will be marked with an "**S**" in the lower left corner of the image on the main image screen while in the MID mode.

To view the *ShotSave* folder, click down arrow under <Study> and left click on *ShotSave Folder***.**

NOTE:
ShotSave™ images are stored into a special ShotSave™ study (folder).
Acquisition will be disabled while the ShotSave™ study is open.
ShotSave™ images can also be deleted after they have been saved.
Refer to the Mark Image for Delete section.

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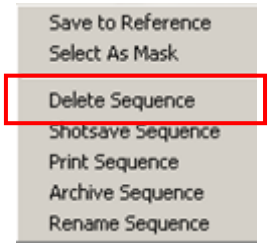
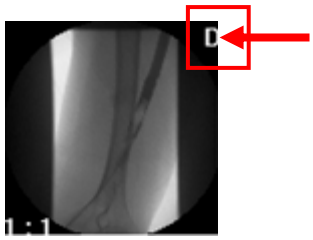
7.5. Mark for Delete

This feature allows an entire sequence to be marked for deletion. In order to delete a sequence, the pointer cursor must be active and the sequence thumbnails displayed.

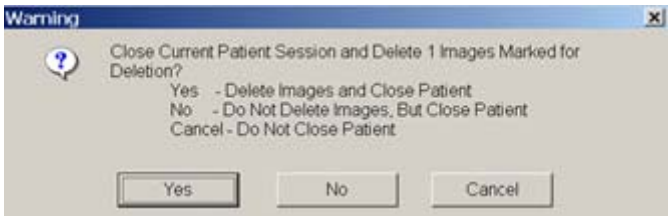
1. Place the cursor over a thumbnail and right-click.
2. The Right Click menu will be displayed



3. Select "Delete Sequence"
4. A Delete "icon" will appear as a "D" in the upper right corner of the thumbnail as well as in the lower right corner of the image in the main image display area.



5. When the patient file is closed, a warning window will be displayed asking for confirmation of the delete sequence operation


Warning
Close Current Patient Session and Delete 1 Images Marked for Deletion?
Yes - Delete Images and Close Patient
No - Do Not Delete Images, But Close Patient
Cancel - Do Not Close Patient
Yes
No
Cancel

6. Read the descriptions for each button and then make selection.

WARNING:
This is the only confirmation that is displayed for deleting images.
Once images have been deleted by selecting the Yes button in the Warning screen, images can no longer be retrieved.

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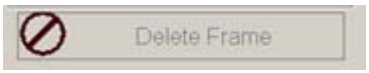
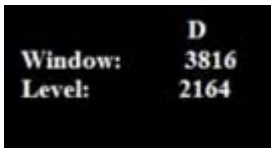
7.5.1. Mark Frame for Delete

This feature allows an individual image to be marked for deletion. In order to delete an image, the pointer cursor must be active.

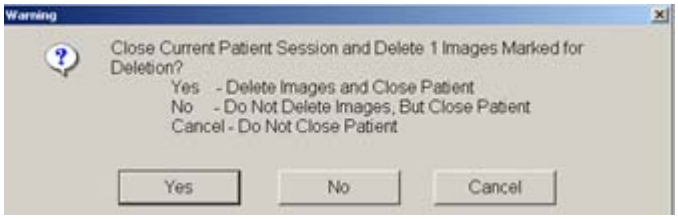
7.5.2. Single Image Display



1. Image is displayed in Main Image screen
2. Click on Delete Frame button on Expanded Control Box.
3. D will appear in the bottom right portion of the screen (above Window & Level settings)



4. When the patient file is closed, a warning will be displayed asking for confirmation of deletion.


Warning
Close Current Patient Session and Delete 1 Images Marked for Deletion?
Yes - Delete Images and Close Patient
No - Do Not Delete Images, But Close Patient
Cancel - Do Not Close Patient
Yes
No
Cancel

5. Read the descriptions for each button and then make selection.
6. Image will be deleted when patient file is closed.

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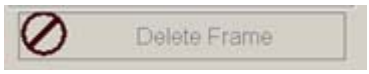
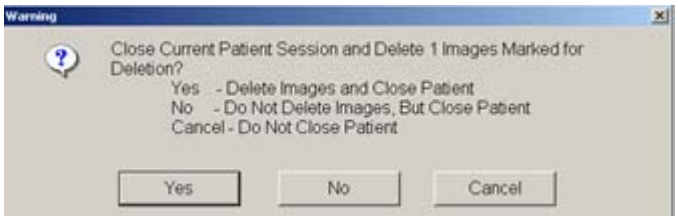
7.5.3. Multiple Image Display



1. Images are displayed in the Main Image screen
2. Left click Cursor when over the image to be deleted.
3. A box will highlight the image.
4. Click on Delete Frame button on Expanded Control Box (Lower Processing Panel).
5. When the Patient File is Closed, a Warning will display asking for confirmation of deletion.


Warning
Close Current Patient Session and Delete 1 Images Marked for Deletion?
Yes - Delete Images and Close Patient
No - Do Not Delete Images, But Close Patient
Cancel - Do Not Close Patient
Yes
No
Cancel

6. Read the descriptions for each button and then make selection.
7. Image will be deleted when patient file is closed.

WARNING:
Once images have been deleted by selecting the Yes button in the Warning screen, image can no longer be retrieved.

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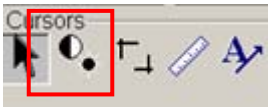
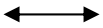
7.6. Adjust image Brightness/Contrast

 Brightness/Contrast Cursor **BRIGHTNESS (LEVEL) VERTICAL (Up/Down) MOUSE MOVEMENT** 	To adjust the BRIGHTNESS *(Level)* of the image:  1. Select the Brightness/Contrast cursor from the Cursor Tool bar. 2. Position the cursor in the image display area. 3. Click and hold the left mouse button and drag the Cursor UP to increase BRIGHTNESS; DOWN to decrease BRIGHTNESS. ***NOTE:*** *To increment or decrement by Brightness alone, hold the keyboard SHIFT key down while moving Cursor. The object is to change one element at a time.*
 Brightness/Contrast Cursor **CONTRAST (WINDOW) HORIZONTAL (Left/Right) MOUSE MOVEMENT** 	To adjust the CONTRAST *(Window)* of the image: 1. Select the Brightness/Contrast Cursor from the Cursor Tool bar. 2. Position the cursor in the image display area 3. Click and hold the left Mouse button and drag the Cursor RIGHT to increase CONTRAST; LEFT to decrease CONTRAST. ***NOTE:*** *To increment or decrement by Contrast alone, hold the keyboard CONTROL (ctrl) Key while moving Cursor. The object is to change one element at a time.*

NOTE:
The Brightness/Contrast adjustment applies to all frames in the sequence. If a sequence is replaying, the brightness/contrast cursor is not available.

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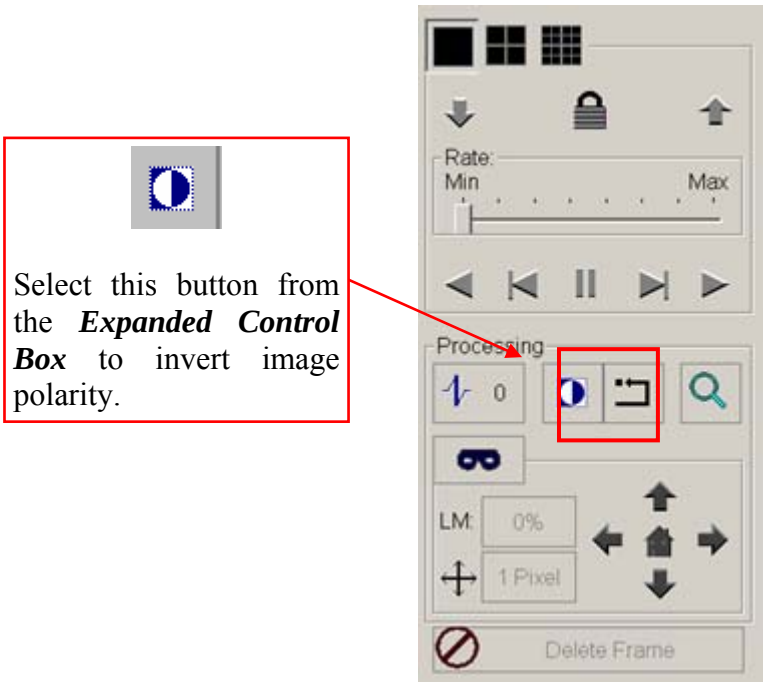
7.7. Invert Image Polarity

The *Invert* Button changes the polarity of an image from a positive image to a negative image or from negative to positive.



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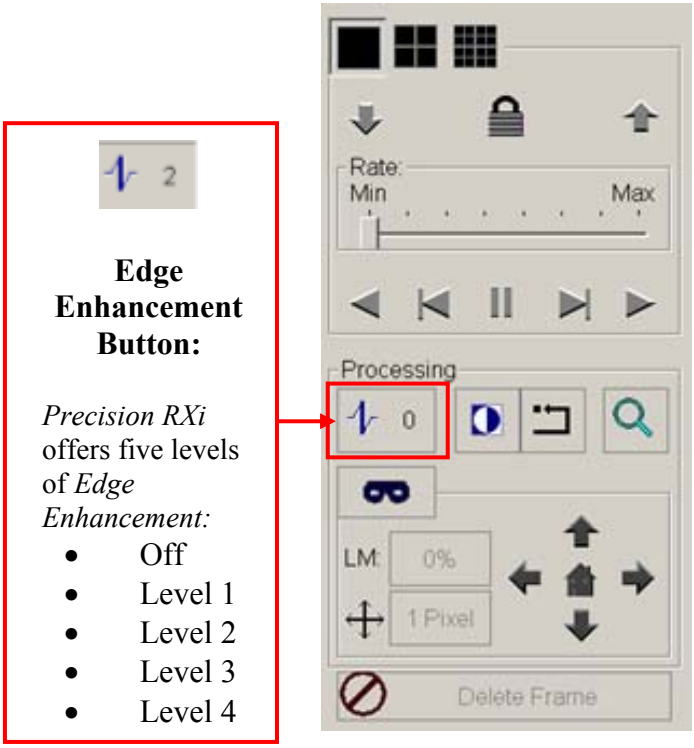
7.8. Edge Enhancement

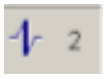
Edge Enhancement is a digital *Image Processing Filter* that is used to make pictures look sharper than they really are. An outline is added to foreground objects so that they stand out from the background. Details are more defined and can be more easily evaluated.

Select the appropriate button from *Standard Control box (Upper Processing Panel)* for required level of *Edge Enhancement*.



To Change the Edge Setting:

1. Select the button multiple times to cycle through the available settings.
2. The image display will be changed instantly as the Edge setting is changed.
3. A number on the Edge Enhancement button will indicate the level of Edge Enhancement applied.



Example showing level 2 of *Edge Enhancement* has been applied.

NOTE:
Edge Enhancement changes will only be applied to the Sequence currently being viewed.

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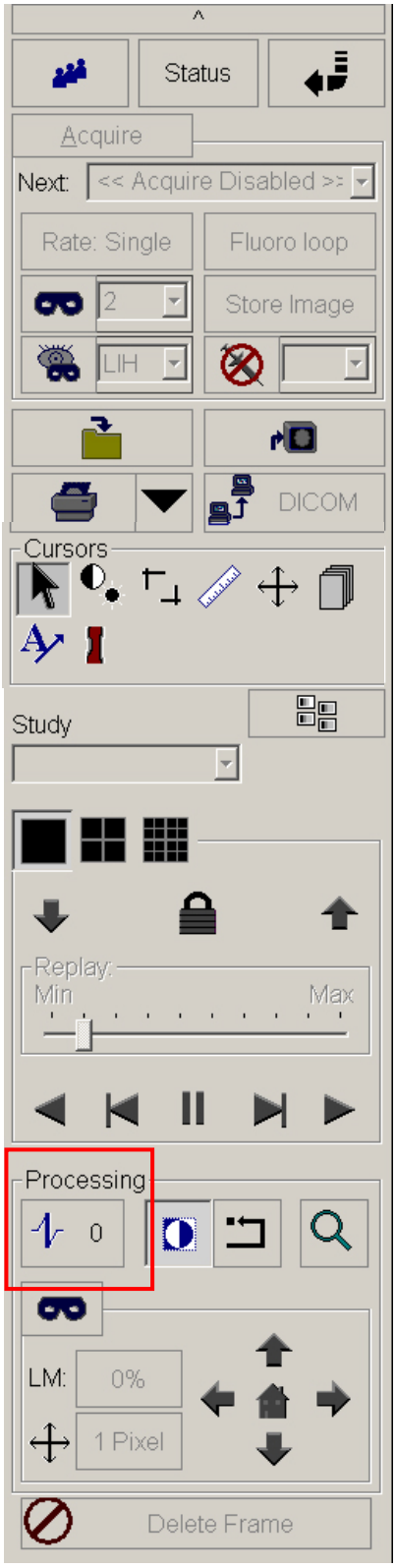
The *Fluoro Edge* setting can be changed when doing *Live Fluoro*. Edge Enhancement applied during Fluoro Acquisition temporarily changes the Default Edge Level set in Doctor Preferences.
When this image is reviewed, the *Applied Edge Level* will be *Carried Over* and the button on the *Processing* screen will reflect that level.
Changes to the *Image Processing Edge* button will be carried with the reviewed image. Changes to the *Image Processing Edge Level* will NOT change the *Default Acquire Edge Levels.*

In all other instances, the *Edge Enhancement* button on the *Image Review* and *Processing GUI* will show the level set in *Doctor Preferences.*

> ***NOTE:***
>
> *The Edge setting will Default to the Acquisition setting the first time the Sequence is viewed after Acquisition unless that Sequence being displayed is a ShotSave™ Sequence. ShotSave™ Sequences will be Default to the Edge setting that was active when the ShotSave™ was created.*



GUI Shutter

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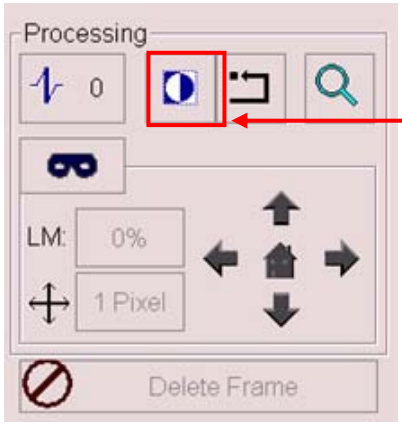
7.9. Reset to Default

The Reset to Default feature allows the user to return the image back to the originally captured Doctor Preference State (preset image processing settings). This allows the user to manipulate the Contrast / Brightness Settings in attempt to gain the best display of the acquired image.
If the user is not satisfied with the results, the Default button can be used to return the image to the state prior to altering any settings.

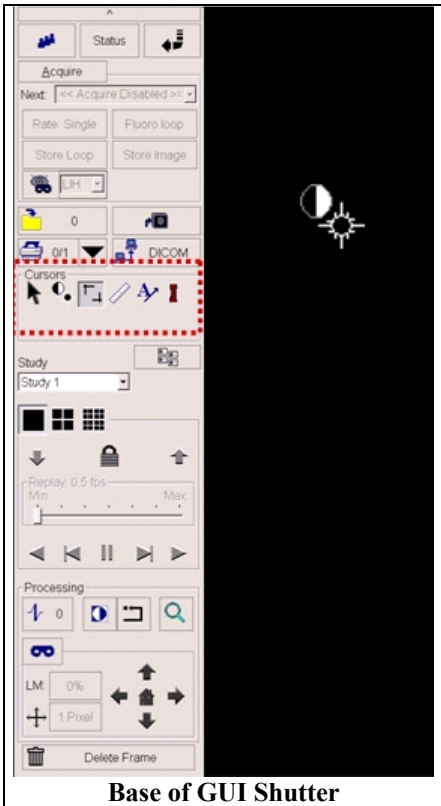


An Interface NOT Enabled with BC/RA Mode

Single click the Default icon from the Expanded Control (Lower Processing Panel) to set the image back to its original ***Doctor Preference State.***

Default Icon from Main GUI Mode
Applies to any post-acquisition processing.

If the user would like to correct this setting and restore the imaging system back to Doctor Preferences State for future image acquisitions, then click on the Reset button once in the GUI Shutter Mode.



Base of GUI Shutter

The ***Reset button*** at the lower portion of the GUI Shutter will not reset any reviewed image or any Motion or Edge Enhanced changes. It just restores ***Doctor Window/ Level Preferences*** to upcoming images that will be acquired.

Any of the buttons on the GUI shutter (dark GUI) will be applied to upcoming acquired images, not to already acquired images.

Rest Icon within GUI Shutter Mode

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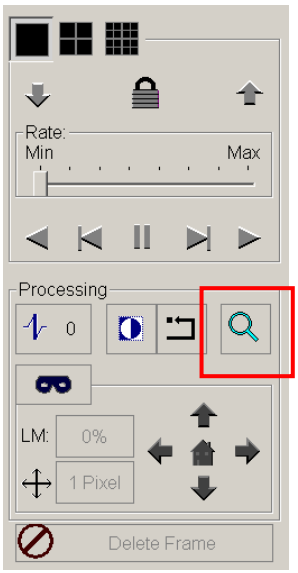
7.10. Zoom

The ZOOM feature allows magnification of the currently displayed image to twice its size.
The center of the image is shown on the monitor screen. Selecting the button automatically activates the pan function.

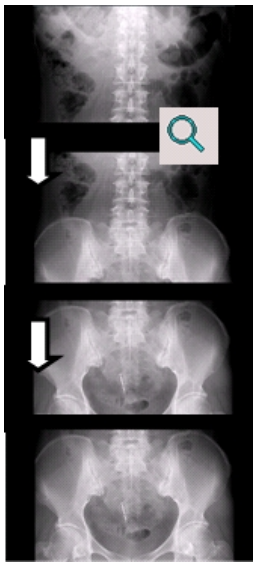


Single click the "Zoom" icon from the ***Expanded Control*** box to enlarge the image. To disable *Zoom* function, single click Zoom icon.

ZOOM Icon

7.10.1. Panning

Select the Zoom icon, and then placing the *Cursor* on the image allows the *Pan Function* to be active.When viewing an image close-up, you will only be able to review a portion of the image, much like viewing a sample plate under a microscope. It has to be slid into a viewable area, but only so much space is available.



The Pan function will allow the entire image to be viewed in parts by sliding, or Panning the image into the viewable area. While *Zoom and Pan* is activated, it may be necessary to view a part of the image that is not shown on the screen (as in the case of using *Shutters* to hide portions of an image).

1. Position the Cursor on the image.
2. Click and hold the left mouse button.
3. Drag the Cursor in the direction you want to move.

REMINDER:
This image acquiring system is not intended for Bone Work. Purpose of graphic is to depict connective nature of panning of images ONLY.

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7.11. Electronic Shutters

Each of the four sides of the black area surrounding the image is considered a *shutter*, and may be extended to match the exact image area to better view the image.

Shutter settings are applied to the image displayed in the screen as well as hardcopies of the images. These shutters may be adjusted manually for each image, or automatically.

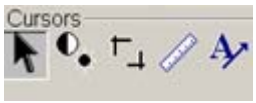
7.11.1. Manual Positioning of Electronic Shutters

Each image that is acquired will be analyzed to determine the position of the collimator blades. This information will be saved with the image data for use during review. The Auto Digital Shutter feature must be enabled in Doctor Preferences in order for them to be applied during acquisition.

As images are acquired when the Auto Digital Shutter feature is active, the system looks for the image boundary and extends the shutters to a few pixels beyond that point depending on the Shutter setting (low, medium, or high).

During image review, if manual shutters were applied to the image previously, the system will show the manual shutter settings instead of the automated shutters.

- During replay of a sequence, the position of the electronic shutters can be adjusted manually to compensate for errors with the automatic detection.
- Any adjustment will apply to all frames within that sequence.
- Each side of the black mask that surrounds the image can be adjusted separately.

	1. Select the Shutters cursor from the Cursor Selection tool bar. 2. Place cursor on one of the four edges (top, bottom, left, right), hold down the left click button and drag the shutter horizontally/vertically (as applicable) to the desired position. 3. Each of the four edges can be adjusted individually or, the cursor can be placed in a corner where two edges meet. The two edges can b e adjusted simultaneously.

NOTE:
If Auto Shutters is ***Off*** *in Doctor Preferences and during acquisition, clicking the shutters cursor will automatically apply shutter settings, if applicable, to the on-screen image and all images that are in the sequence.*

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7.12. Reference Image Display

The Reference Image Display option allows any image being displayed on the Primary Image Monitor to be held on a second monitor. There are two available Reference Image Display options:

- Single Image Display with Thumbnail selection
- Multi-format Display

7.12.1. Single Image Display w/ Thumbnails

Up to fourteen images may be stored as reference images in the thumbnail list. Additional stored images may be sent to the reference display, but those images will overwrite the previous thumbnails starting with the oldest.

The *Reference Image Thumbnails* operate in a queue fashion; the oldest marked image will be replaced as needed.

7.12.2. Multi-image format Display

The Multi-image format Reference Display supports the following formats:

- 1 – on – 1 Display
- 2 – on – 1 Display with Horizontal Tiles
- 2 – on – 1 Display with Vertical Tiles
- 4 – on – 1 Display

There will be no storage beyond the number of images displayed on the screen. Additional stored images may be sent to the reference display from the Primary Display's Thumbnail window. The Reference Image tiles will operate in a queue fashion; the oldest saved image sent to reference will be replaced as needed.
The following additional operations are also available for the Reference Display Option:

- Save Image to Reference via GUI
- Save Image to Reference from thumbnail

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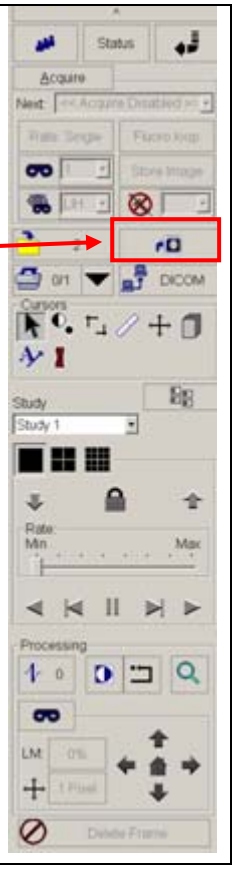
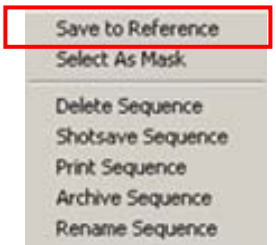
7.12.3. Save Image to Reference

Any image displayed on the Primary Display may be saved to the Reference Image Display. The images sent to reference are not required to be stored to the disk.

From the Standard Control Box

Save Reference Button	1. Click the Save Ref button in the Standard Control box. 2. The current image is sent to the Reference Monitor and is added to the Reference Thumbnail List.	

From the thumbnail Right Click Menu

	1. Move the Cursor over the Thumbnail representing the Sequence to be Saved to Reference and Right click. 2. Click the Save to Reference button. 3. The current image is saved to the Reference Monitor.

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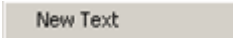
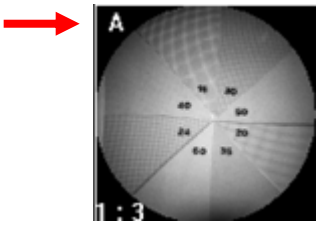
7.13. Annotations

Select the Annotation button to choose from several options available for marking images. Customize Annotations according to individual requirements or select from a list of preset Annotations available.

From the cursor control bar:

	1. Select the Annotation cursor from the Cursor Tool bar to enter Annotation mode.
	2. Move cursor into the Main Image area. 3. Cursor will become an "A" indicating the Annotations feature has been activated.
	4. Double click within Main Image area to display the Annotations sub-menu. 5. Make selection according to specific needs.

7.13.1. New Text Annotation

 	1. Click to create a new text Annotation. 2. The <NEW ANNOTATIONS> text entry box will be displayed. 3. The default text is highlighted. Type new text. 4. When entry is complete, click outside the text box (or hit the Enter key) and the new Annotation will appear on the Main Image screen The thumbnail representing that image will be marked with an "A" in the upper left corner.

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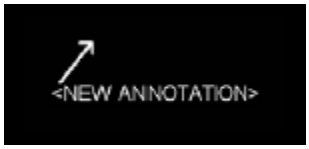
7.13.2. New Pointer Annotation

New Pointer	1. Click to add a Pointer (or arrow). 2. An arrow will appear within the Main Image screen.

7.13.3. New Text and Pointer Annotations

New Text and Pointer feature allows for the combination of these separate features into one interactive Annotation

New Text and Pointer	1. Click to add a Text and Pointer Annotation 2. Both text and an arrow will appear within the Main Image screen. Then, begin typing new text. 3. Click outside the area of the Annotation or (hit enter) to save Annotation. 4. See parts 7.13.5 and 7.13.6 for instructions on changing or moving the Pointer or Text Annotation. 

7.13.4. Predefined Annotations

Precision RXi offers the options of entering and re-using a set of commonly used Annotations. This saves the time of creating individual Annotations for marking Left, Right, technician's initials, etc. Each time an Annotation is created, it becomes "predefined" for that application.

There are two ways to enter Predefined Annotations – Using the *Annotation* Cursor or the **Right Click** menu.

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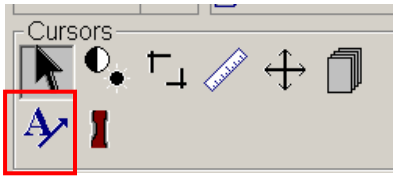
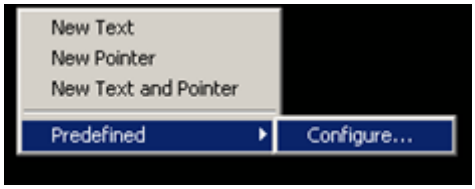
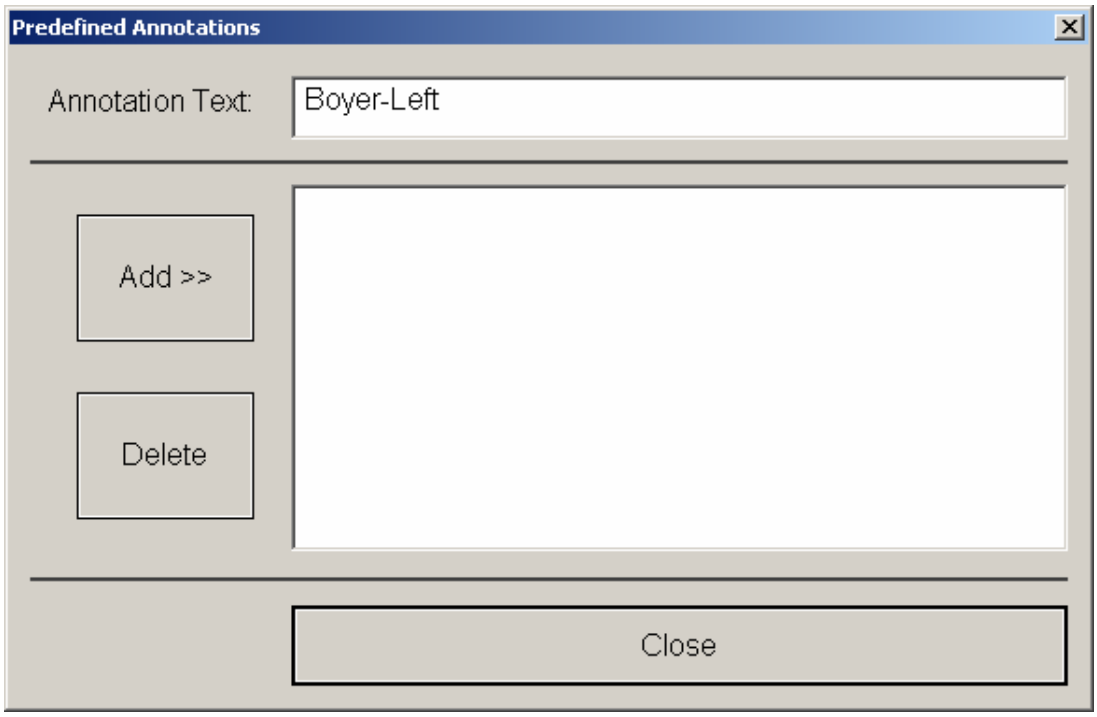
7.13.4.1. Using Annotation Sub-Menu



1. Select the Annotation Cursor from the Cursor Tool Bar to enter Annotation mode.
2. Move Cursor into the Main Image area.
3. Cursor will become an "A" indicating Annotations has been activated.
4. Double click within Main Image area to display the Annotations Sub-menu.



5. Click on Predefined from Annotations Sub-menu.
6. Click on Configure to display the Annotation Name screen.



Annotation Name Screen

7. Type in the Preferred Text. This Text will also be used to form the list of Predefined Annotations.

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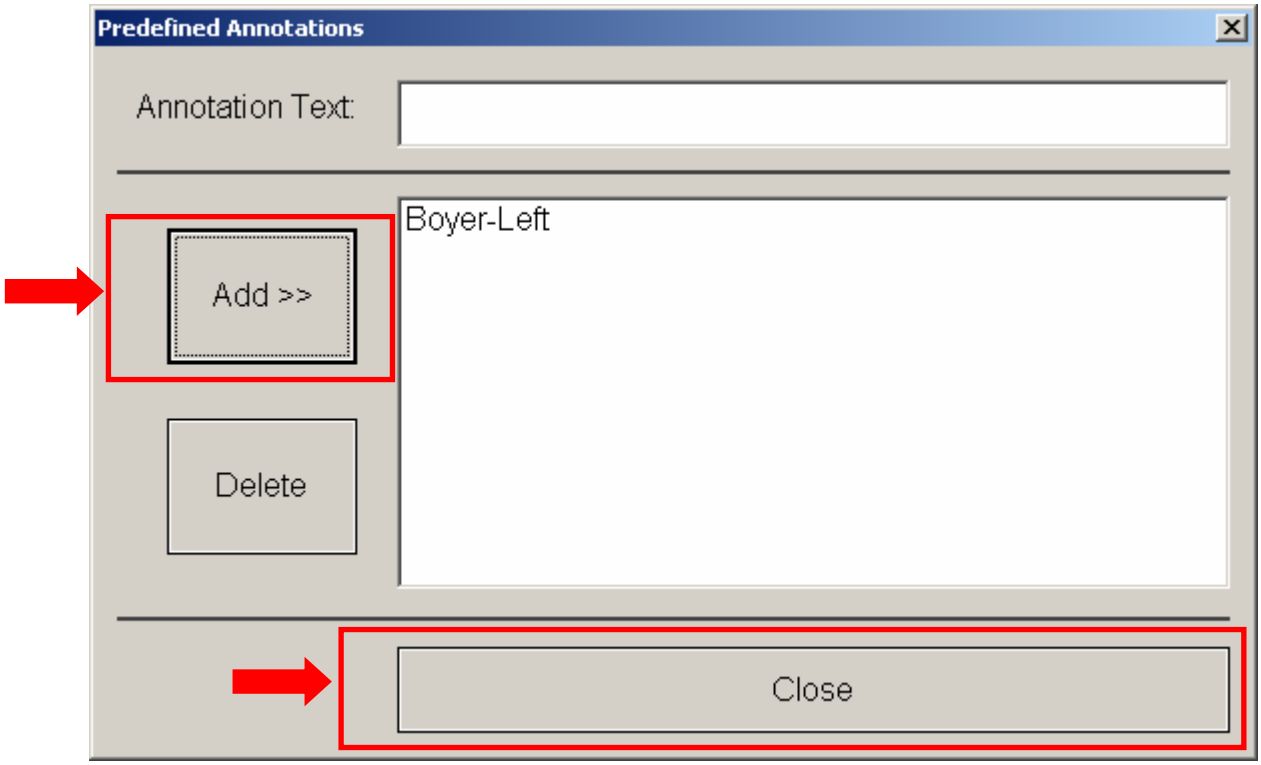
8. Click

.



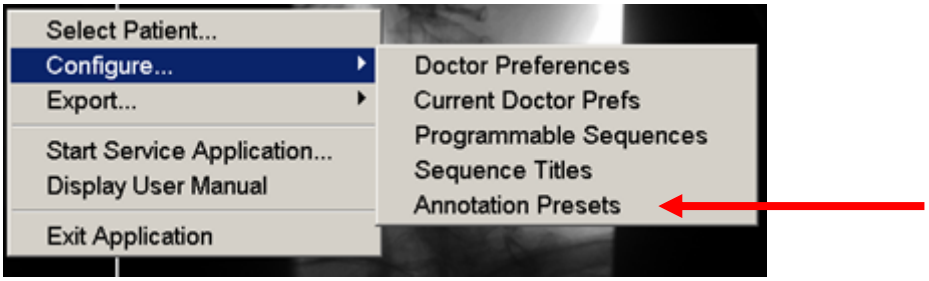
Annotation Name Screen

9. When adding Annotations is complete, select the Close button to save the list. Selecting the "X" in the upper right corner of the window will Cancel/Erase any Annotation changes made in the previous steps.

7.13.4.2. Using Right Click Menu

Predefined Annotations can also be created from the *Right Click* menu accessible from the *Main Image* screen.

1. Right click within Main Image screen to display sub-menu.
2. Place cursor over Configure. The Right Click sub-menu will appear.
3. Click on Annotation Presets



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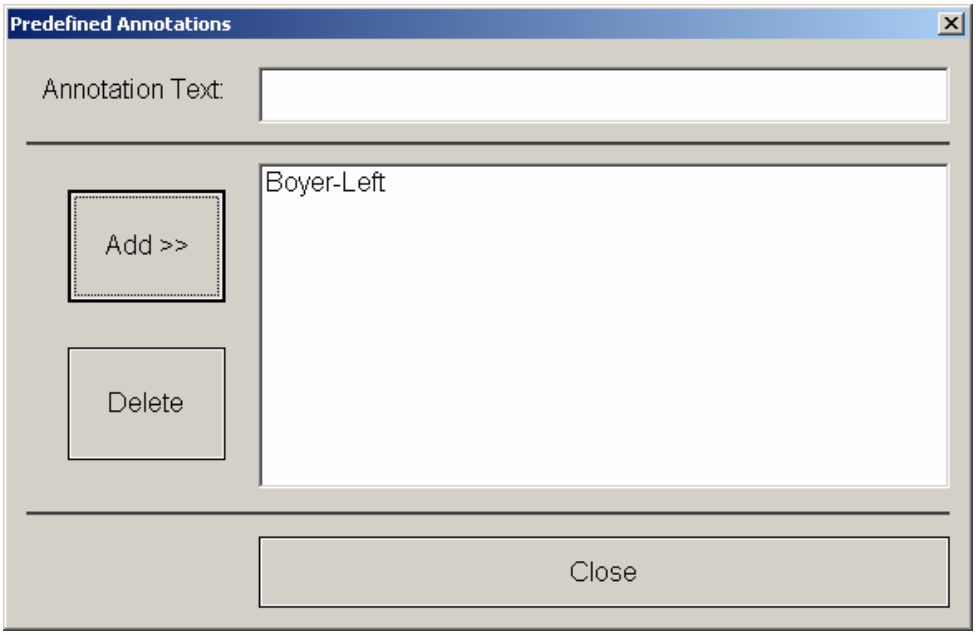
4 The Annotation Name screen will be displayed



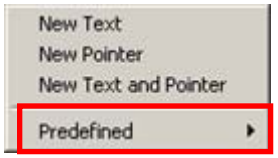
5 Type in the desired text. This text will also be used to form the list of Predefined Annotations.

6 Click.

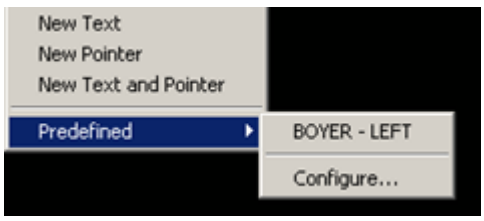
7 When adding Annotations is complete, select the Close button to save the list. Selecting the "X" in the upper corner will Cancel and Erase any Annotation changes made in the previous steps.

7.13.4.3. Using Predefined Annotations

When an **Annotation** has been added to the list of those predefined, it can be selected for the current image as follows:



1. From Annotation submenu, select Predefined.
2. The list will appear.



3. Highlight Annotation to be added and left click.

The Annotation selected will be added to the **Main Image** screen and saved with the image data.

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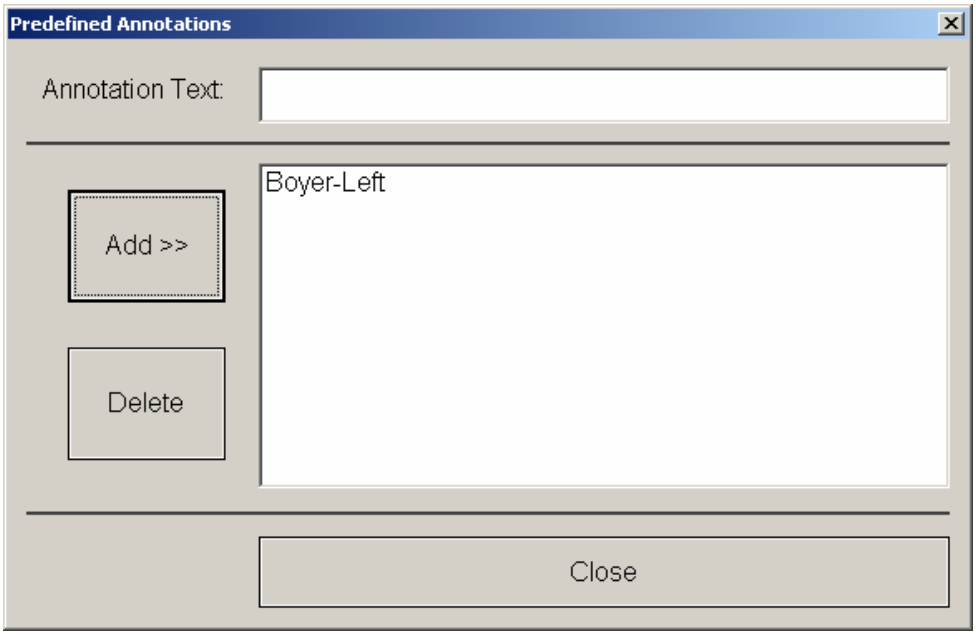
7.13.4.4. Delete Predefined Annotation

To delete an item:

1 From the list of Predefined Annotations on the Annotation Name screen, highlight the Annotation to be deleted.



2 Click the Delete button to instantly delete the Annotation from the list.

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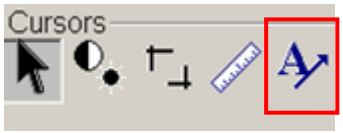
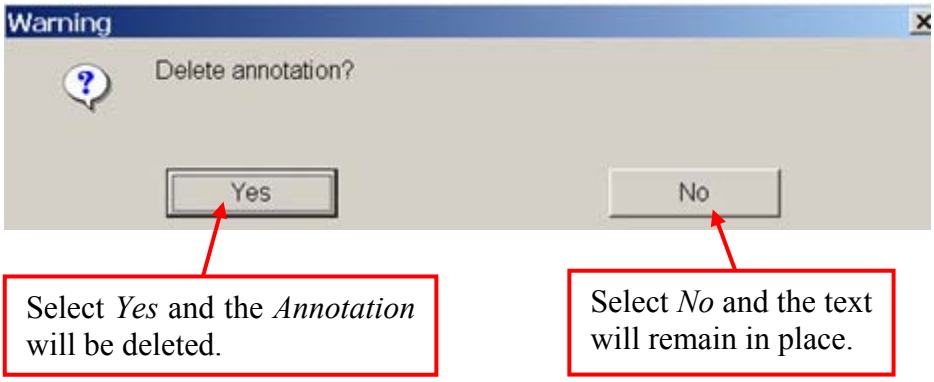
7.13.5. Change/Delete/Move Text Annotations

Use the *Annotations Sub-menu* to change *Annotations.* Select and position the *Annotations Cursor* over the *Text Annotation* and single **Right** click.
The *Annotations Sub-menu* will display and select the action desired.

For DSA Application

	Select the Annotation Cursor from the Cursor Tool Bar to enter Annotation mode.

Text Annotation Sub-Menu

Delete	Click on *Delete* to remove the selected *Annotation.* A window will appear asking for confirmation of *Delete Request.*  Make appropriate selection. This window will close automatically and the *Main Image* screen will display.

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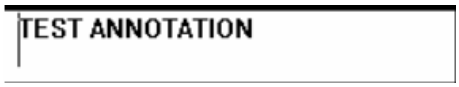
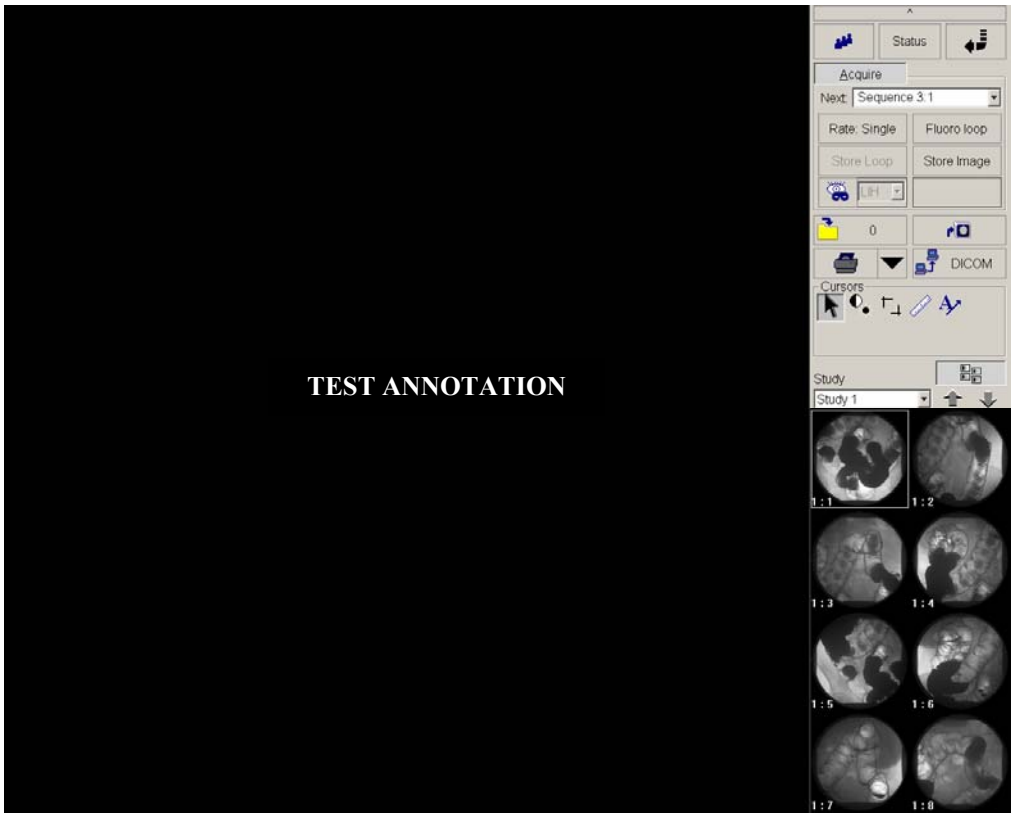
Edit	Edit can be used to enter or change existing Text Annotations. 1. Click on Edit to display the Text Entry dialog box.  2. The existing Text is highlighted. 3. Enter the Desired Text. 4. Click outside the Text Box or press « Enter » key to save changed Text.  **DSA Main Image Screen with Text Annotation**
Move	The Text Annotation can be moved to any location within the Main Image screen. 1. Click on Move to activate. 2. The Cursor becomes a hand attached to the text annotation. 3. Drag Cursor to required location. 4. Left click mouse when location is correct. The new position of the Annotation will be saved.

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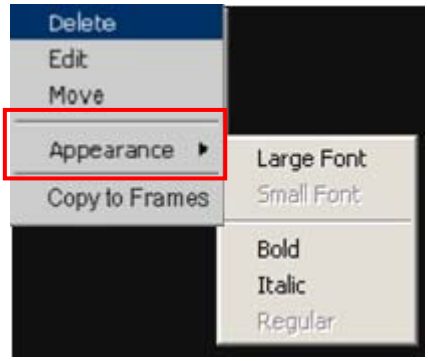
***NOTE**:*
To quickly move Text Annotations on-screen, place Cursor over the Annotation and hold down left Mouse or in-room Pointing Device button. Drag the Annotation to required location within Main Image screen and then, release the Mouse or in-room Pointing Device button to relocate the Annotation.

Appearance	Select the Appearance button to display editing options available. The "grayed-out" settings i ndicate the current active Annotation settings.  **Example:** In menu shown at the left, Annotation is set using small, regular (non-italic) font.
Large Font	Select the *Large Font* button to change the font of the specified Annotation from small to the larger fault (default is the large font).
Small Font	Select the *Small Font* button to change the font of the specified Annotation from large to small font.
Bold	Select the *Bold* button to set Bold font for specified Annotation.
Italic	Select the *Italic* button to italicize the Annotation.
Regular	Select the *Regular* button to disengage Bold and Italicized lettering.
Copy to Frames	Select the *Copy to Frames* button to copy the current annotation to all frames in the current sequence.

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7.13.6. Change/Delete/Move: Pointer Annotation

Position the *cursor* over the Pointer and *right click* to view *Pointer Annotation Sub-Menu:*

Pointer Annotation Sub-Menu

Delete	Click on *Delete* to eliminate *Pointer Annotation.* A window will appear asking for confirmation of *Delete Request.* Select *Yes* and the *Arrow* or line will be deleted. Select *No* and the *Arrow* or line will remain in place. Make appropriate selection. This window will close automatically and the Main Image screen will display.
Move	The Arrow or Line Annotation can be moved to any location within the Main Image screen. 1. Click on Move to activate. 2. The Cursor becomes a hand icon attached to the Pointer Annotation. 3. Move the Hand/Cursor to the Point the Arrow/Line is to be located. 4. Left click the Mouse or in-room Pointing Device button when location is correct. The new position of the Pointer Annotation will be saved. ***NOTE:*** *Quickly move Line/Arrow Annotations on-screen by placing Cursor over the Annotation and holding down left Mouse or in-room Pointing Device button. Drag the Annotation to required location then release the Mouse or in-room Pointing Device button to relocate the Annotation.* **To Lengthen or Shorten Arrow** 1. Place Cursor over either end of the Arrow and left click. 2. A box will appear at both ends of the Arrow. 3. Position Cursor on the box at either end. 4. Click and hold the LEFT mouse button. Then move the Cursor until the line /arrow is the desired length and in desired position. 5. Release mouse and new position will be saved.

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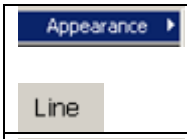
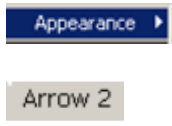
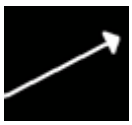
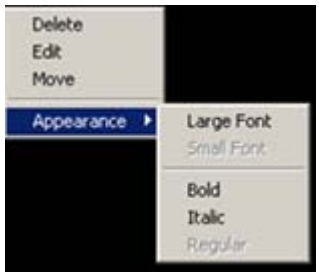
	Click to change the *Arrow* to a *Straight Line.*	
	Click to return *Annotation* to *Default Arrow.*	
	Click to change current *Annotation* to *Alternative Arrow*.	
	Click to use a finer line for the A Arrow.	

7.13.7. Change/Delete/Move: Text and Pointer

Position the *Cursor* **over the *Pointer*** and *Right click* to view the *Pointer Annotations sub-menu.*		Pointer Annotation Sub-Menu
Position the *Cursor* **over the *Text*** and *Right click* to view the *Text Annotations sub-menu.*		Text Annotation Sub-Menu

To Edit Text or Pointer portion of Text and Pointer Annotation, see Sections 7.13.5 and 7.13.6.

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7.13.7.1. Delete Text and Pointer Annotations

1. Position Cursor over the Delete menu item in either the Text or the Pointer Sub-menu.

2. A window will appear asking for Confirmation of Delete Request; make appropriate selection. Both the Pointer and the Text will be deleted from the display.

7.13.7.2. Moving Text and Pointer

Follow instructions in 7.13.5 to change or move the Text portion of the Annotation.

> ***NOTE:***
> *When the Annotation portion of a Text and Pointer Combination is moved, the tail of the Pointer remains attached to the Annotation but the head of the Pointer remains in the same position.*

Follow instructions in 7.13.6 to change or move the Pointer portion of a Text and Pointer Combination Annotation.

To move the Pointer portion of a Text and Pointer Annotation, remember:

- The head of the Pointer can be moved anywhere on the screen while the tail of the pointer and the Annotation remain in the same position.
- The tail of the Pointer can only be moved to a different position on the Text Annotation.
- If any part of the Pointer besides the end point is selected, the entire Pointer will move left or right in relation to the Annotation.

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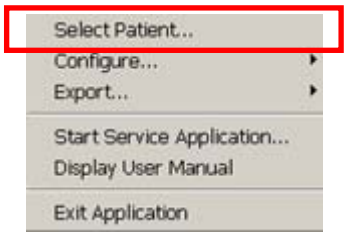
7.14. Edit Sequence Title

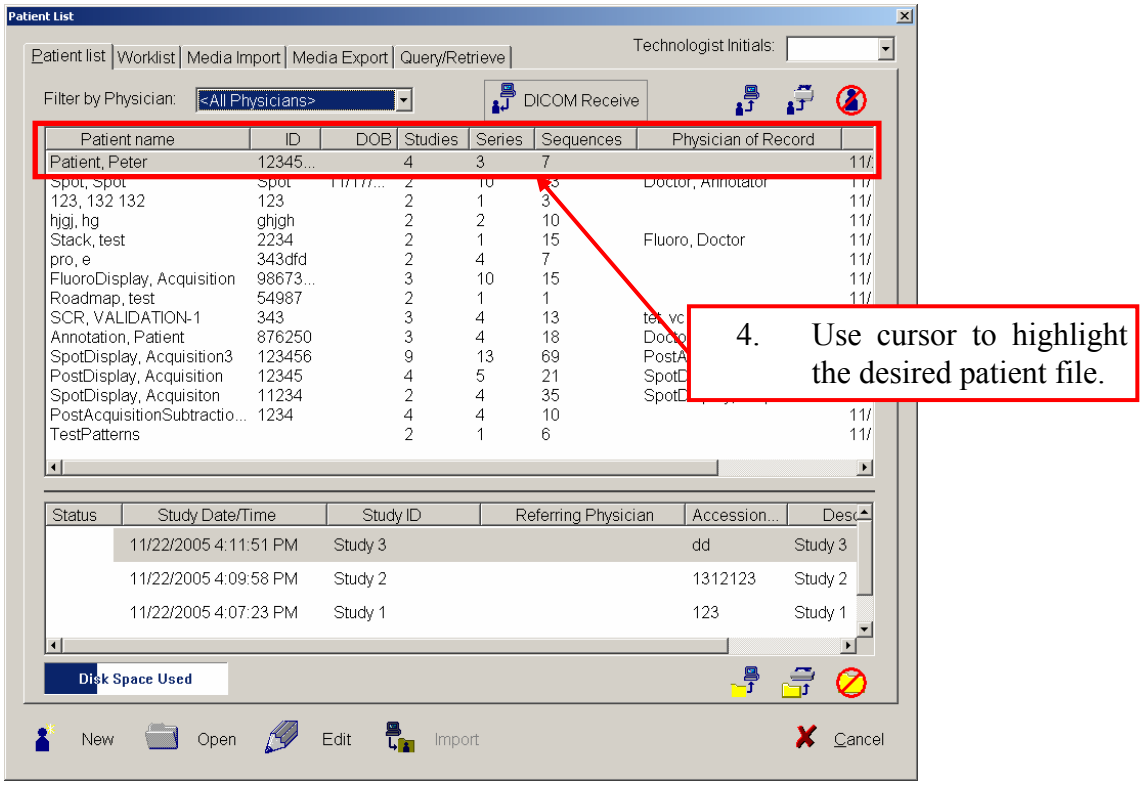
7.14.1. Edit Sequence Title from Patient List

A new title can be typed over the current entry of the combo box:

1. Right click with cursor over the image in Main Image screen. The Right Click menu will be displayed.
2. Click on Select Patient:



3. The Patient List screen will be displayed:



Patient List Screen

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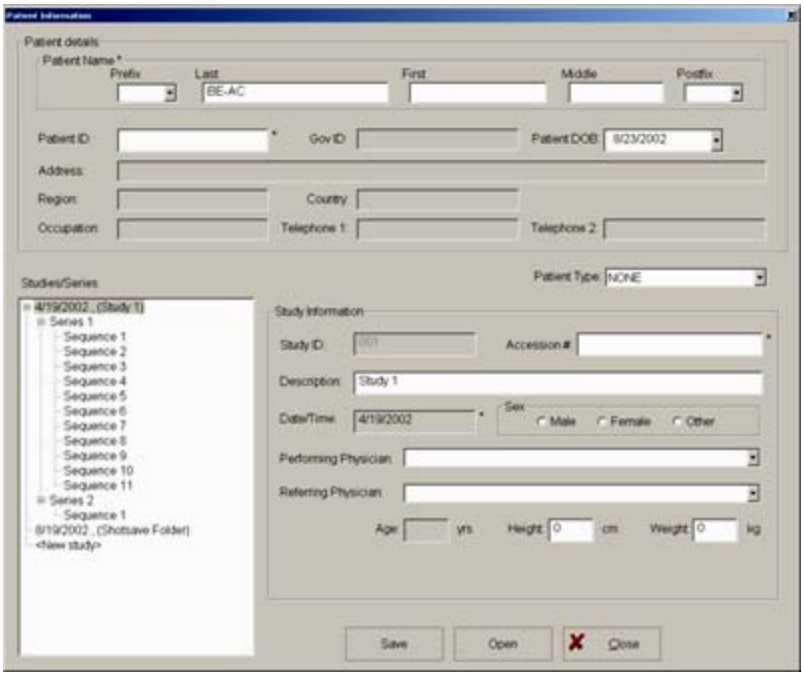
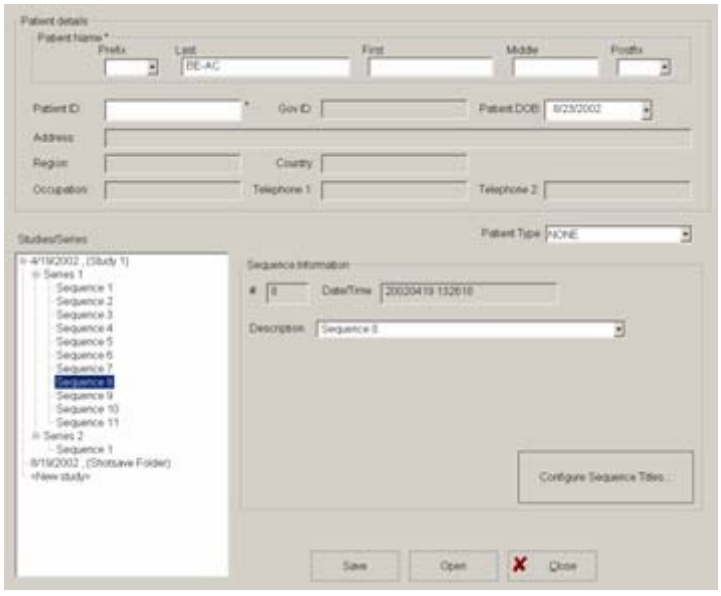
5. Select the Edit button . The *Patient Information Screen* will be displayed:



Patient Information Screen

6. Left click on Sequence in the Studies/Series window.
7. Screen changes to allow sequence title to be changed (see figure that follows).



Sequence Title Screen

8. Enter New Title in Description Box and than click Save to save the changes.

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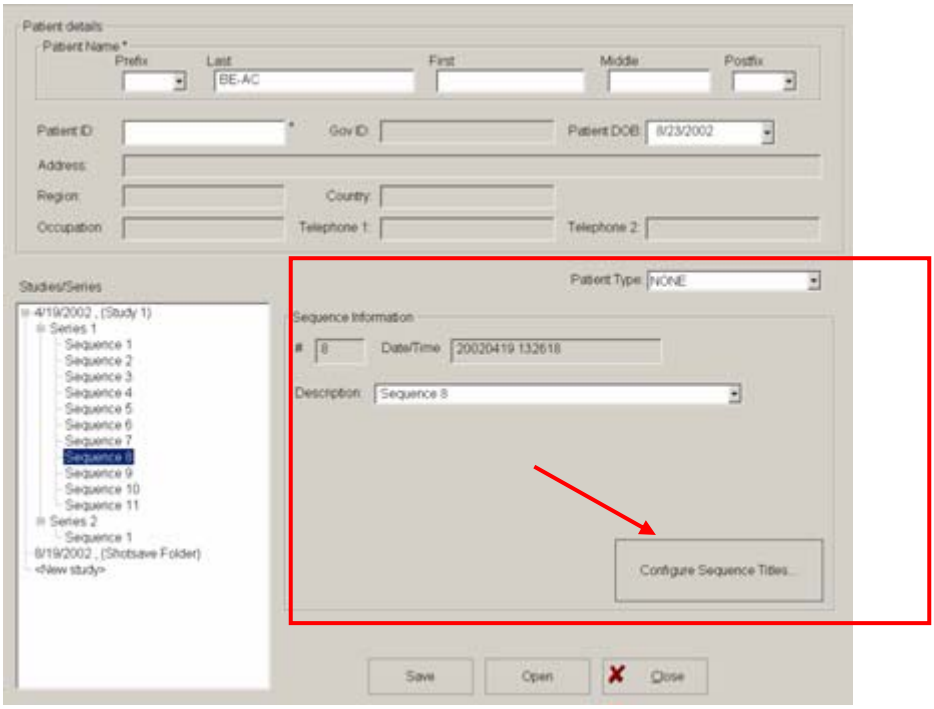
7.14.2. Create a New Predefined Sequence Title

To add a sequence title that can be added to a list of predefined sequence titles for easy selection later:

1. From the Sequence Information window, click on <Configure Sequence Titles>.



2. The *Predefined Sequence Titles* screen will be displayed (see next figure):

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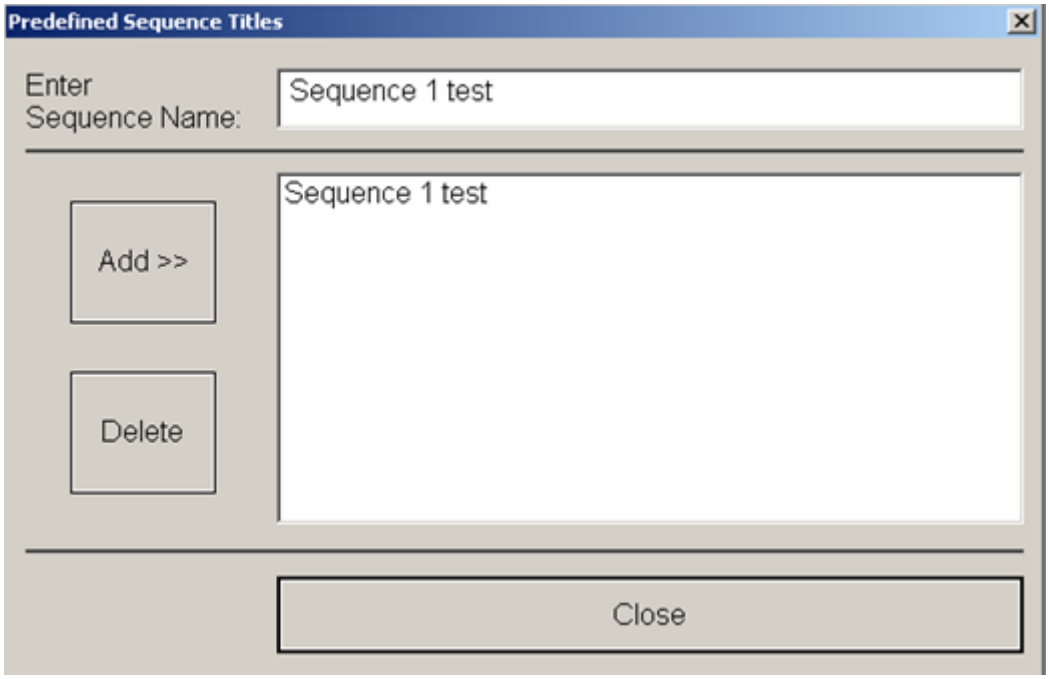


Predefined Sequence Title Dialog Box

3. Enter the name for the sequence, then click the

button.
4. Repeat step #3 to add other Sequence Titles.

5. Click

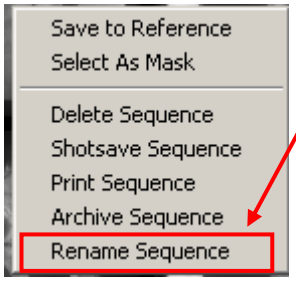
to store the new sequence titles and exit screen.

NOTE:
To delete a Predefined title from the list, highlight the title and then click Delete.

7.14.3. Edit Sequence Title – Thumbnail Right Click Menu

A sequence can quickly be renamed directly from the thumbnail of the image.

1. Right Click while over the Thumbnail image to display sub-menu



2. Select *Rename Sequence*. The *Change Sequence Name* dialog box will be displayed

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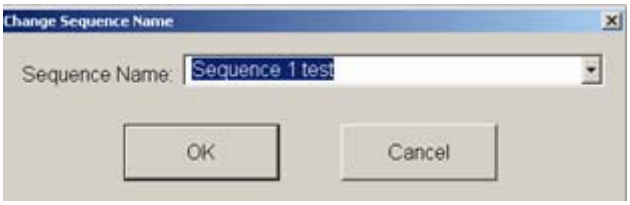


3. Enter revised sequence title, then click OK.

4. The sequence name will be changed immediately.

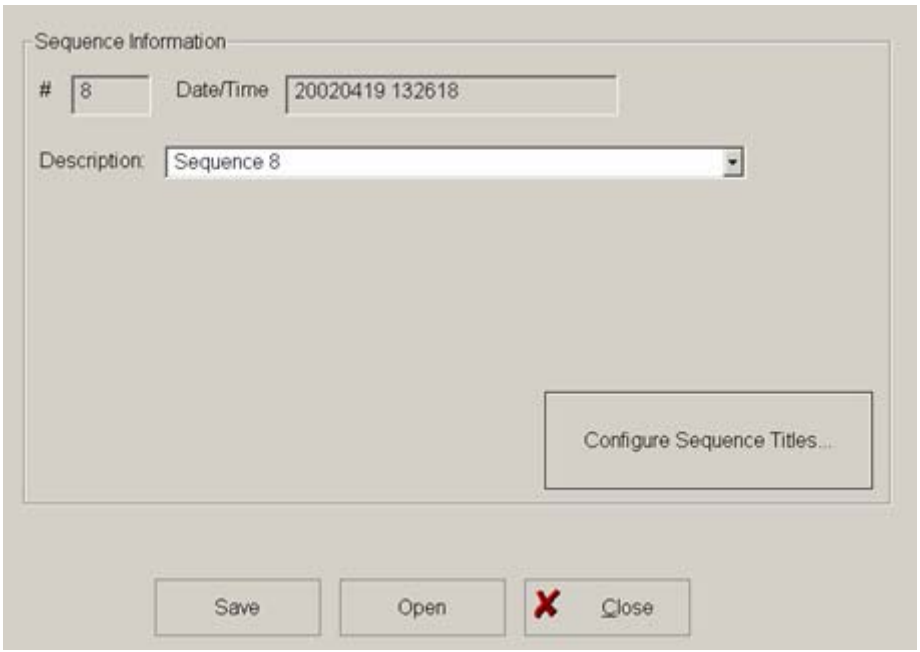
7.14.4. Selection from Sequence Title Library

To select a title from the Sequence Title Library:

1. Click down arrow to view available titles next to the Description box.

2. Highlight the title to be selected

3. Click Save to save selection or Cancel to revert to previous title



Sequence Information Screen

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7.15. Fluoro Video Bypass

Live Fluoro is displayed on the Primary In-room Monitor with no obstructing graphics or Text any time that Fluoro Radiation is active. The live image replaces the Current Review Image during live acquisition. The last complete frame of image data acquired becomes the new LIH image placing the system into the Acquisition LIH State when Fluoro Radiation is terminated when in Acquire Mode.When in Review Mode, the Live Fluoro image replaces the current Review image as long as Fluoro is active. When Fluoro is no longer being acquired, the previous Review Image will be displayed.

7.16. Image Stacking (DSA Only)

In DSA, x-ray images of arterial blood vessels are taken both before and after the introduction of a dye. The computer "subtracts" one set of data from another with the resulting image showing only the dye and, therefore, the shape of the artery through which the blood is flowing. Arterial shape is important in the determination of possible circulatory problems aiding in the diagnosis of heart disease and other circulatory disorders.
Use the Image Stacking feature to consolidate a series of images into a single image showing the blood vessel completely filled with contrast media. The term Image Stacking is used as a general term covering the following specialized features:

- Maximum Opacification
- Minimum Opacification
- Multi-Mask (also called Frame Averaging)

Images can only be stacked if they are part of the same sequence. If an attempt is made to stack images from different sequences, a warning will be displayed.

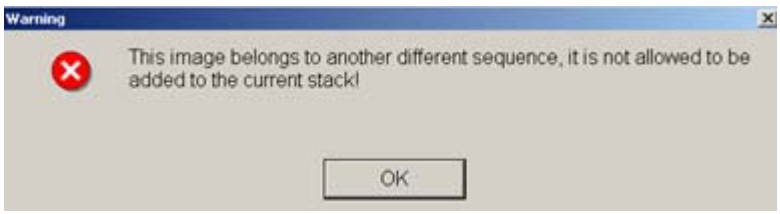
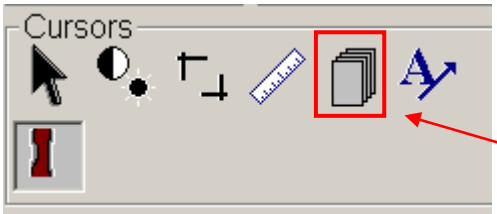


Image Stacking is selected via the **Cursor Tool Bar**



RF/DSA Cursor Tool Bar

1. Click on shutter icon in the Cursor tool bar.

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1. The Image Stacking window will replace the Standard Control Box in the upper right of the Main Image screen and the cursor will become a "stack" .

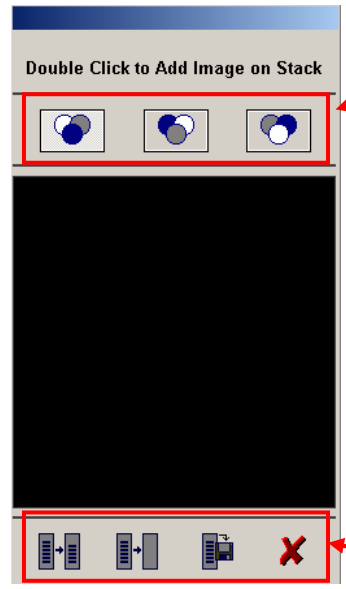
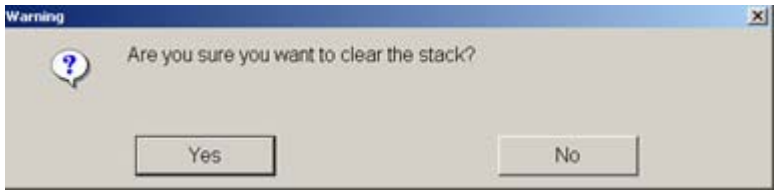


Image Stacking User Interface

2. Double left click on each individual frame to be added to the stack. As each image is added to the window, the composite image will be updated to reflect the addition of the new image.

Use the buttons on the tool bar for selecting the type of stacking to perform: Average, Maximum Opacification, or Minimum Opacification. And otherwise manage the Image Stacking function.

Image Stacking User Interface Buttons	
	Click for Maximum Opacification
	Click for Frame Averaging
	Click for Minimum Opacification
	Click to "undo" last stacking action. No warning will be displayed
	Click to clear the stack. The following warning will be displayed. 
	Click to save the stacked image and close the stacking interface. No warning will be displayed.
	Click to cancel the stacking feature.

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7.17. Real-Time Mask Subtraction

Also referred to as Masking, this feature allows for the subtraction of the current image from a mask image in order to enhance viewing dye contrast within the vein.

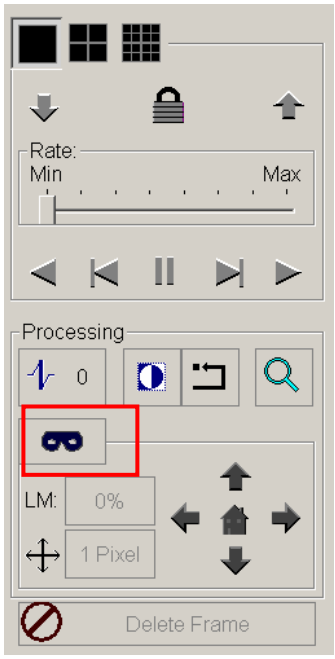
Photo-spot Sequences - Activation / Deactivation

To Activate Subtraction During Image Review:

1. Single click the "Mask" button in the ***Expanded Control Box*** with the mouse or in-room pointing device to activate subtraction using the current image as the mask.

Mask Button

2. The button will appear depressed on the screen



To Deactivate Subtraction:

1. Single click the "Mask" button.

Mask Button

2. The current image will be displayed unsubtracted, using previous image's Processing settings.
3. The mask button will return to its previous state.

Selectable Mask
The image that is currently displayed when subtraction is activated will be used as the mask.

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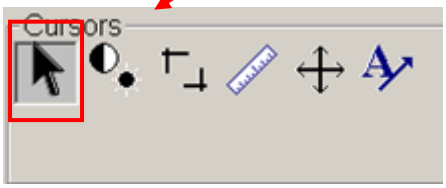
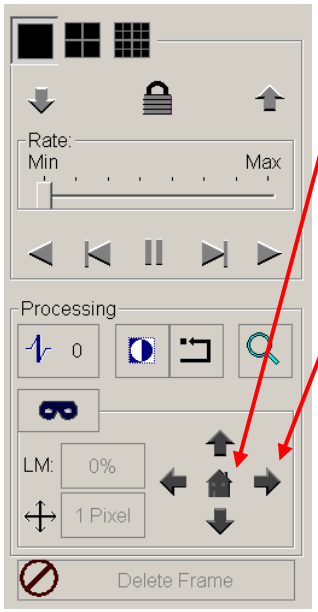
7.18. Re-registration

If a *Subtracted* image is not properly aligned with the *Mask i*mage, the *Mask* image can be moved pixel-by-pixel in any direction until aligned. The *Mask* image can be *Re-registered* by selecting the *Re-registration Cursor* from the *Cursor Tool Bar*.



Hold the LEFT mouse button down in the *Main Image Area* and drag until the desired amount of *re-registration* has been achieved. This cursor will not appear on the *Cursor Tool Bar* unless the image that is displayed is a *Subtracted* image.



To return the mask to its default position, click the "Home" button in the ***Expanded Control Box***

The mask image can also be registered by left clicking on the arrow buttons surrounding the "House" icon.

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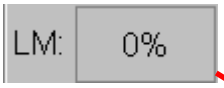
7.19. Landmarking

Once the MASK button is selected, the Landmarking (%) button will be activated on the screen.

Landmarking allows the selection of the percentage of the mask image that is to be added back into the subtracted composite image. This will enable the visualization of some background image data for orientation or other purposes.

To activate Landmarking:

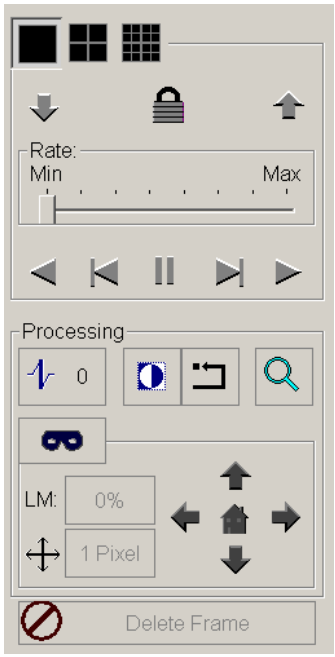
Click on Landmarking button on the Standard Control Box.



Click button to cycle through percentages.
The current setting will be shown on the button.
Available settings for this feature are:

0% - 10% - 25% - 50% - 100%

The higher the %, the higher the visibility of the mask image.



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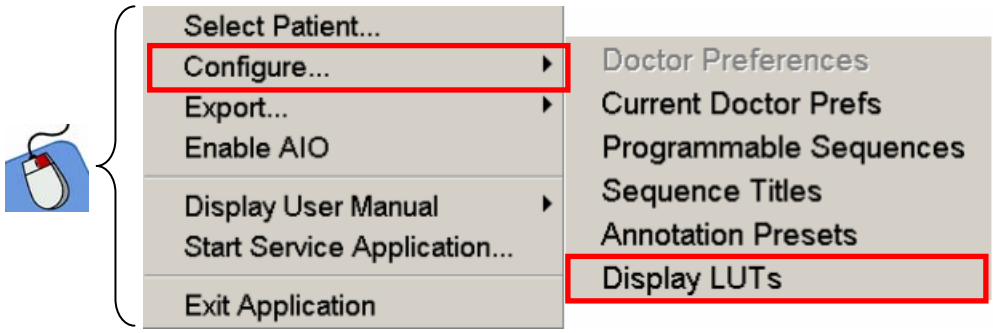
7.20. Display LUTs (Lookup Tables)

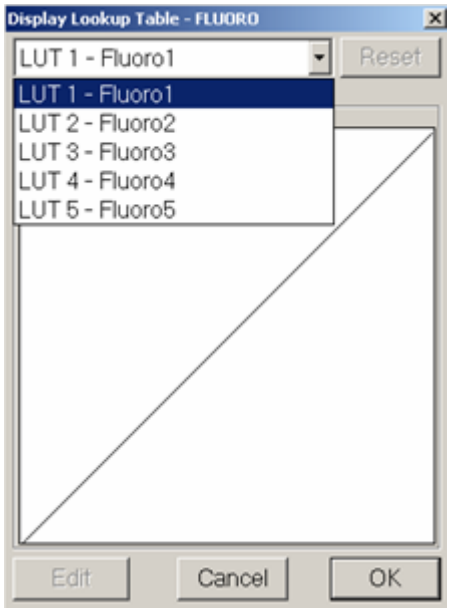
This feature allows for more advanced customization of LUTs by allowing adjustment of the LUT setting during image review. This procedure will override the default setting made in Doctor Preferences and can either be saved as the new default, or used for the specific image being reviewed. Use the following steps to modify default settings:

1. Right click over the Main Image screen when there is an image displayed. The right-click menu will display.
2. Position the cursor over "Configure, " bringing up the sub-menu.

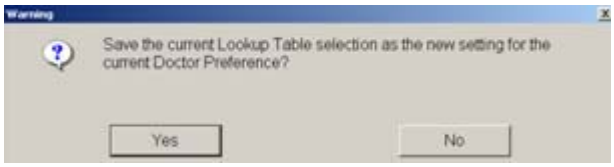


NOTE:
Display LUTs will not be available for images acquired with AIO ON, test patterns, or any unsaved Fluoro image.

3. Click on "Display LUTs" and the Display Lookup Table modification screen will be displayed



4. Click on down arrow to display the available selections. Position cursor over desired selection and click and the click "OK." You will be prompted as to whether or not you want to save this selection as the new Doctor Preference setting.



5. Click "Yes" to save as new default or "No" to leave the default as previously set.

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8. Printing Images

8.1. Printer Setup

System printers are added or deleted within the **Service Applications** function. Refer to the **Precision RXi** Technical Manual, Step 5: 2.4 & 2.5 - Printer Device for complete instructions.

NOTE:
Service Applications must only be performed by a trained service representative.
Please contact the network administrator for assistance in this area.

8.2. Printing an Image

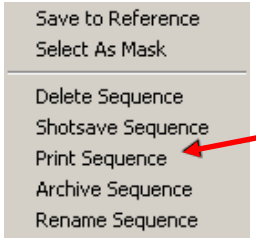
The first time Expose is used for the active frame, a new study called **Print ShotSave** is created and the image/frame is saved to that study and printed from that folder. The letter "S" will appear in the lower right corner of the main image screen to document this action.

Each time an additional study is opened and Expose used, the image/frame will be added to the existing **Print ShotSave Folder**.

The current image can be printed during any mode of operation using the **Print** button.

The image will print using ***Doctor Preference*** settings. Use ***Configure Expose*** to change default settings.

1. Click . The Print Shotsave folder will be created and the image/frame sent to that folder from which it is printed.
2. An "S" will appear in the lower right portion of the screen indicating the creation of this folder.



The only way to create a Print ShotSave Folder is to use the thumbnail right click menu (Print Sequence).

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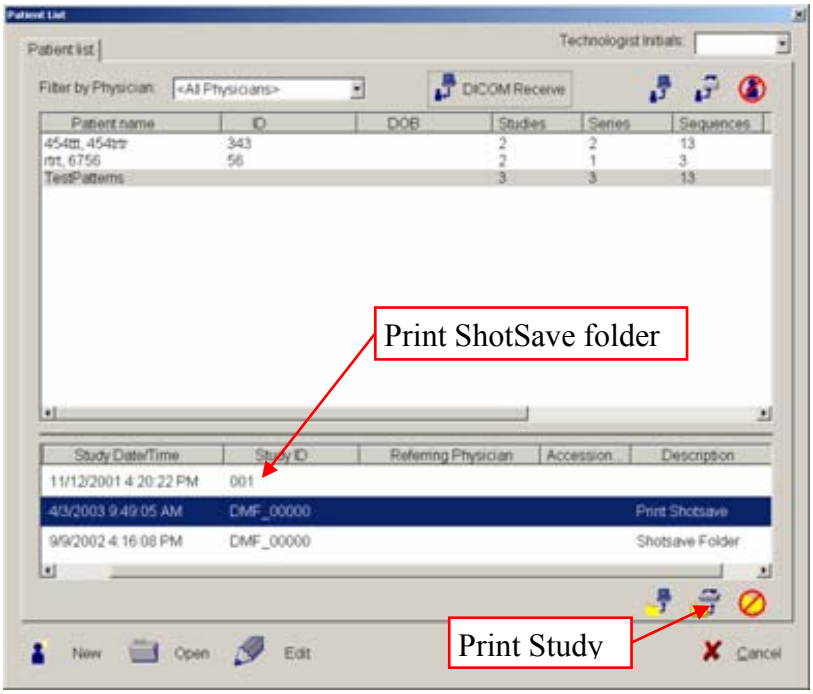
8.2.1. Accessing Print Shotsave

From the Patient List Screen

The Print ShotSave folder will appear as part of the directory in the lower portion of the Patient List screen.



The entire folder can be printed from the Patient list screen by selecting Print Study .

From the Main Image Screen

Use down arrow to access drop-down menu under Study. Scroll the list to find Print Shotsave. Thumbnails representing sequences in this folder will be displayed.	

NOTE:
The maximum number of images in the Print Shotsave folder can be configured in the service application. Refer to the technical manual, Step 5 – 2.1.3 System Options. Images beyond the maximum number as set in the Service Application will automatically be deleted when the clinical application is closed and restarted. The oldest images are deleted first.

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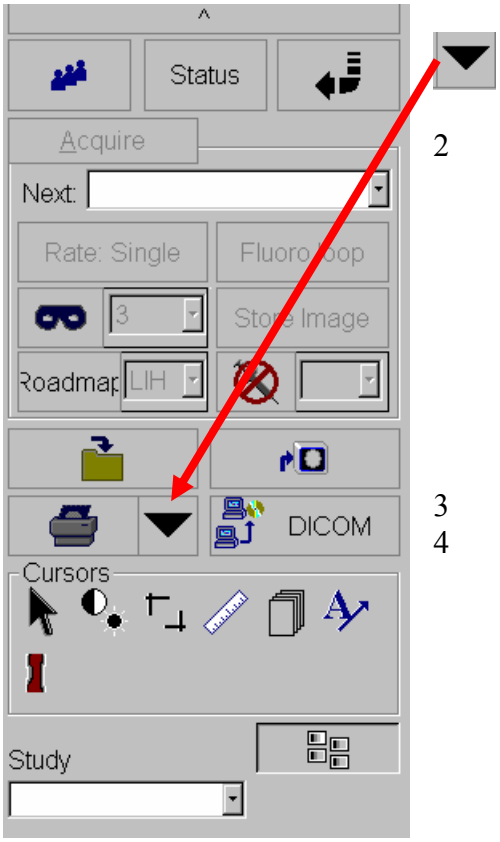
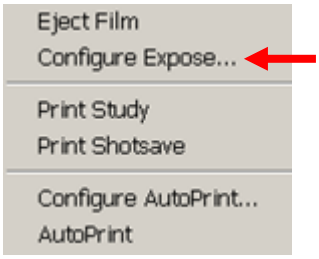
8.2.2. Configure Expose

Use this screen to set print parameters for current patient file.

1 To access this feature, click the arrow next to the Expose button;

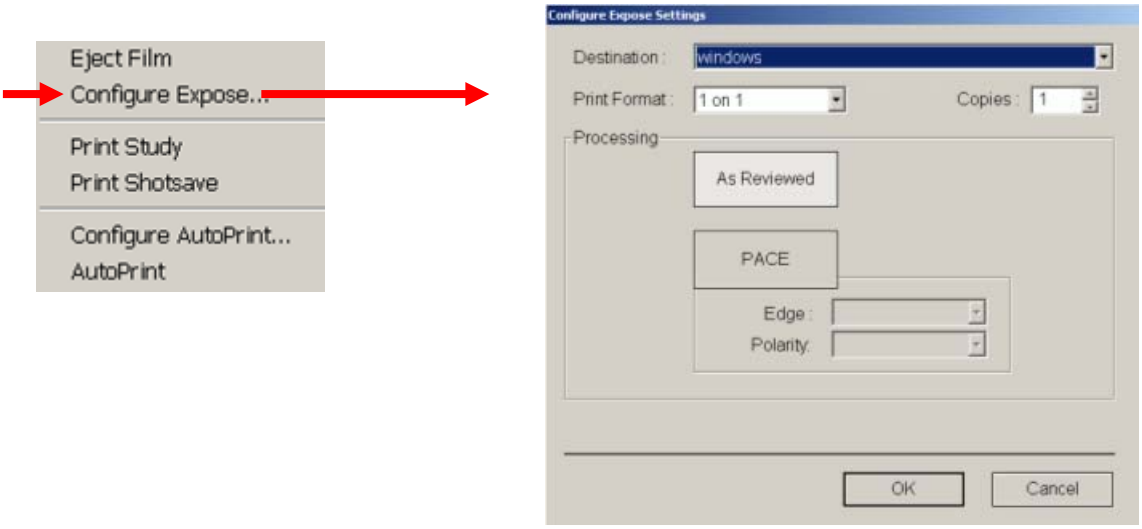


2 The Print Layout sub-menu will be displayed:



3 Click on Configure Expose…

4 The Configure Print Settings window will appear over the image portion of the screen.



Configure Print Settings Window

At this window, the processing defaults used for printing images can be changed.

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Click on down arrow ( ) to display available printers and highlight to select printer for job to be performed.

Print Format :	Select number of images to be printed on each film. To display options, click on down arrow ( ). Ranges from 1-on-1 to 12-on-1. 1 on 1 2 on 1 Vertical 2 on 1 Horizontal 4 on 1 6 on 1 9 on 1 12 on 1 Use up and down arrows within sub-menu to display all available formats. Example shows DICOM print format
Copies :	Enter number of copies (of each image) to be printed or use the up and down arrow keys to increment to the desired number (100 copies maximum). 1
Processing	Choose which processing features should be used for the printed image. As Reviewed Click this button to print with features applied when image was last reviewed. PACE Click PACE button (Post-Acquisition Copy and Enhance) to select Edge Enhancement and Contrast for this printing. The PACE feature automatically enhances images as they are sent to the printer. Clicking on PACE button will activate Edge and Contrast buttons. Only when PACE is activated can changes be made to Edge or Contrast within the Print function.
Edge :	Select level of Edge Enhancement by using the down arrow ( ) to display available settings. Highlight to select. None 1 2 3 4
Polarity:	Select Polarity by using down arrow ( ) to display available settings. Highlight to select. Black Contrast Black Contrast White Contrast

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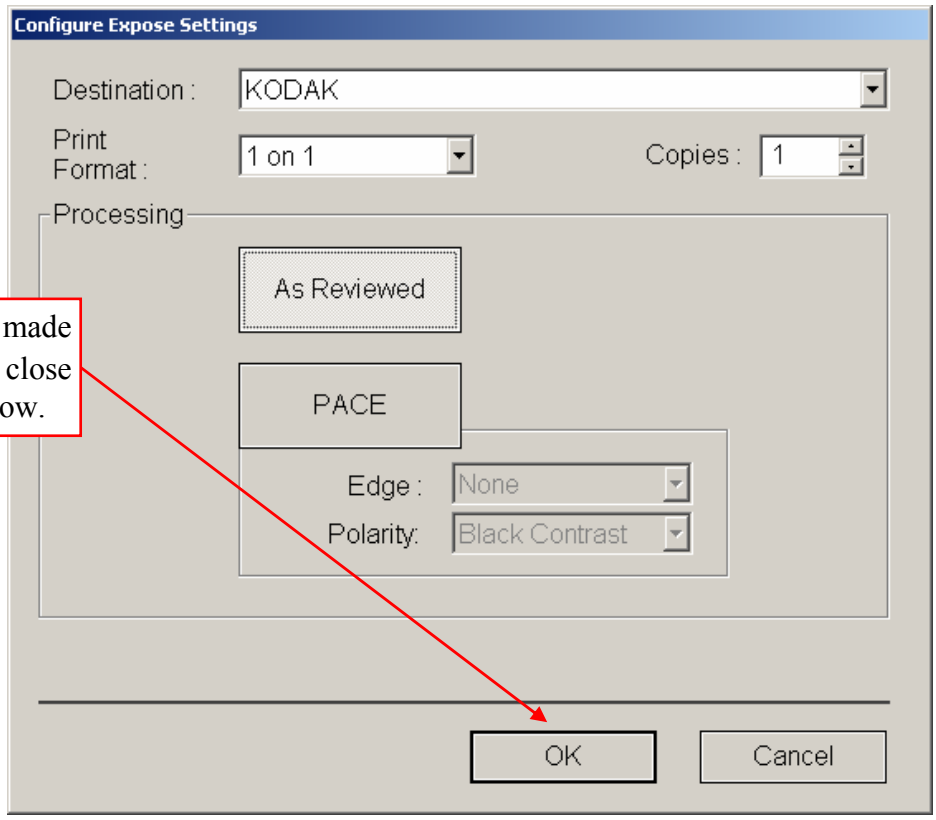
When changes have been made click OK to save and close ***Configure Print Settings*** window.



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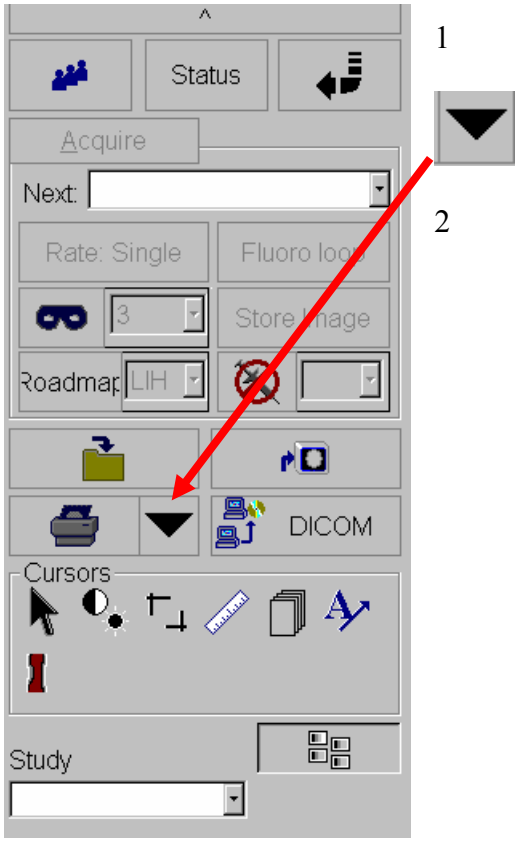
8.3. Eject Film

Use this feature to override the format setting and print a sheet with a different number of prints than what was originally configured.

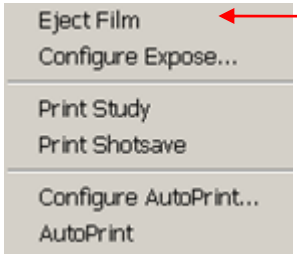
For example, if the system was configured to Print 6-on-1 but only three images have been Exposed, the printer will not print the sheet until six images have been exposed.

The Eject Film feature allows for Exposed images to be printed, despite whether the film sheet is full or not.



1 To eject film, click the arrow on the Print button.

2 The Print Layout sub-menu will be displayed:



3 Click on **Eject Film** button.

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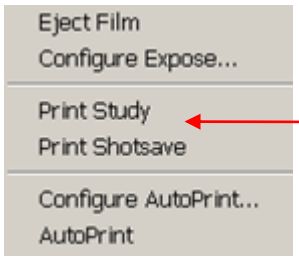
8.4. Print Study

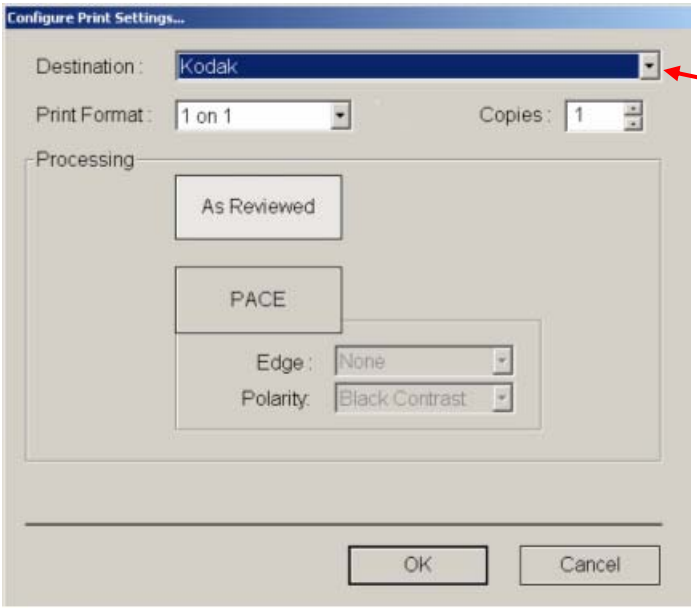
1 To print all the images in a study, click the arrow on the Print button.

2 The Print Layout sub-menu will be displayed:



3 Click on Print Study
4 The Configure Print Settings window will appear
5 Make appropriate selections and then click OK

The images for the current study will be sent to the printer.



Click Down Arrow to change printer selection

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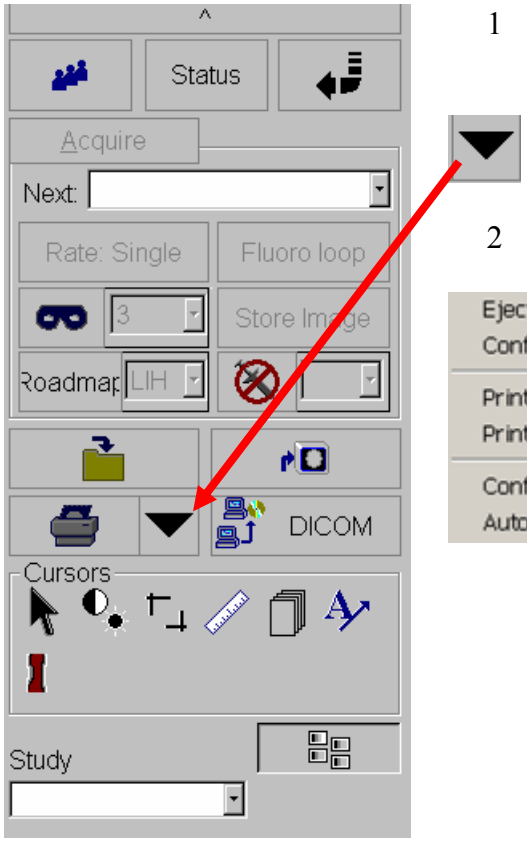
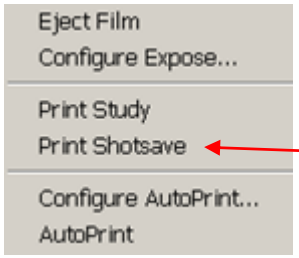
8.5. Print ShotSave

All the images in the Shotsave file can be quickly printed.



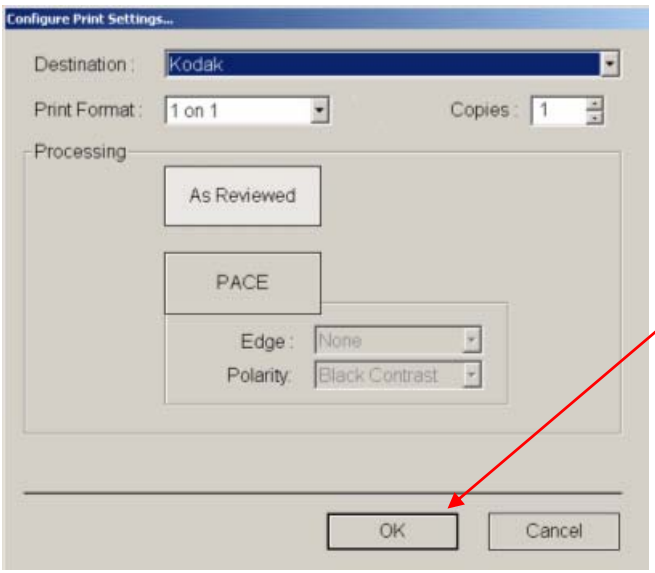
1 To print the Shotsave file images, click the arrow on the Print button.

2 The Print Layout sub-menu will be displayed:



3 Click on Print Shotsave

4 The ***Configure Print Settings*** window will appear.



5. Make appropriate selections and then click OK button.

6. All images in the Shotsave file will be printed.

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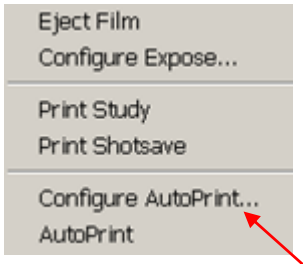
8.6. Configure AutoPrint Features

When the AutoPrint feature is ON, the system sends each image (for the current patient file only) to the printer as it is acquired with PACE parameters applied (if enabled).

Use these instructions to set the parameters that will be used for the images printed using the AutoPrint feature. (Refer to section 8.7 for information on turning the **AutoPrint** feature on and off).

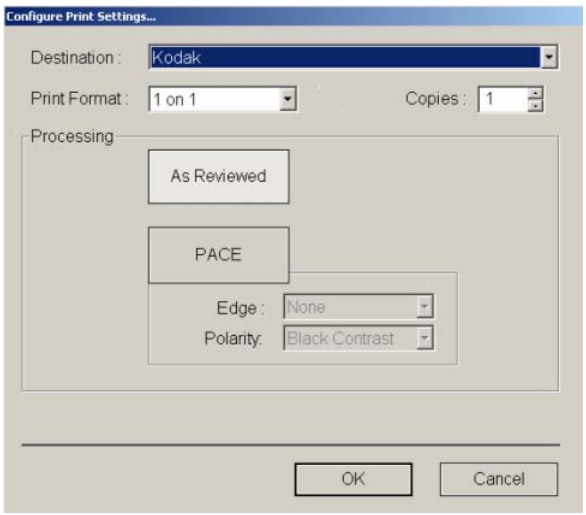
1 To access this feature, click the Arrow button.

2 The Print Layout sub-menu will be displayed:



3. Click on **Configure AutoPrint**

4. The ***Configure Print Settings*** window will appear.



At this window, the processing defaults used for printed images can be changed.

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Click on down arrow ( ) to display available printers and highlight to select desired printer.

Print Format :	Select number of images to be printed on each film. To display options, click on . Use Up and Down Arrows within Sub-menu to display all available Formats. **Windows printers** have available ranges from one to four images per sheet of film. 1 on 1 2 on 1 Vertical 2 on 1 Horizontal 4 on 1 **DICOM printers** have available ranges from one to twelve images per sheet of film. 1 on 1 2 on 1 Vertical 2 on 1 Horizontal 4 on 1 6 on 1 9 on 1 12 on 1
Copies :	Enter number of copies (of each image) to be printed or use the up and down arrow keys to increment the number of copies to be printed (100 copies maximum). 1
Processing	Choose which processing features should be used for the printed image. Click PACE (Post-Acquisition Copy and Enhance) to select Edge Enhancement and Polarity for this printing. PACE¶ The PACE feature automatically enhances images as they are sent to the printer. Clicking on PACE button will activate Edge Enhancement and Polarity Drop-down boxes. Only when PACE is activated can changes be made to Edge or Polarity within the Print function.
Edge :	Select level of Edge Enhancement by using the down arrow ( ) to display available settings. Highlight to select. None 1 2 3 4
Polarity:	Select Polarity by using down arrow ( ) to display available settings. Highlight to select. Black Contrast Black Contrast White Contrast

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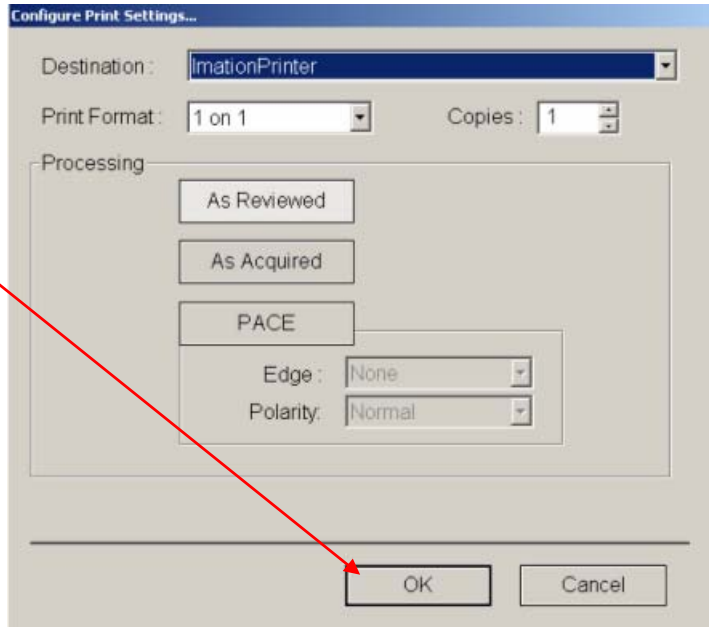
When changes are complete, click the **OK** button to save and close window.



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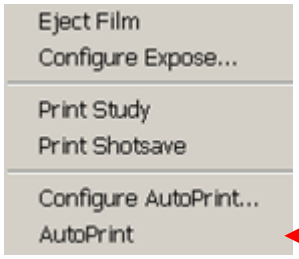
8.7. AutoPrint

When the AutoPrint feature is ON, the system sends each image (for the current patient file only) to the printer with PACE parameters applied as the image is acquired.

1 To turn ON the AutoPrint feature click the arrow next to the Print button.

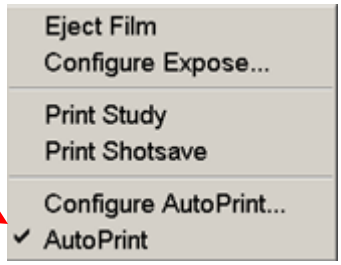
2 The Print Layout sub-menu will be displayed:



3. Click on **AutoPrint**. The sub-menu will disappear and AutoPrint will be enabled.

4. When AutoPrint is enabled, a checkmark (√) will appear in the box.

To check whether or not AutoPrint is enabled, reopen the ***Print Layout*** sub-menu and look for the checkmark.



NOTE:
This feature will remain active for the current patient file until it is turned off. The feature can be turned OFF by reopening window and clicking on ✓ AutoPrint .

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9. Importing and Exporting images

9.1. Introduction

The Precision Imaging System offers several image transfer options providing ample patient data archival flexibility including DICOM Network Export/Import, DICOM Media Export/Import, and Query/Retrieve.
Media Export/Import supports DC and DVD media types with various capacities. Media types shown below are typical capacities purchased. The Nero® 7 Essentials has an intelligent analyzing mechanism built-in to determine disc type and quality level of the disc inserted into the disc burning drive – you will NOT have to indicate this data. Once selecting a disc type/capacity, remain with same selection for consistency purposes. **The manufacturer does NOT recommend mixing media types for any export job**.

WARNING:
Some Precision Imaging System models have the CD writer only.

9.1.1. Supported Media Types

N.	Type	Typical Capacity	Note
1	CD-R	(650 - 700 MB)	* BOTH CD and DVD support multi-session burning. * Any DVD variety writes faster than any CD speeds regardless of X-speed level labeling in the industry.
2	DVD-R	(4.7GB)	
3	DVD+R	(4.7GB)	
4	DVD-R DL (double layer)	(8.5 GB)	
5	DVD+R DL (double layer)	(8.5 GB)	

Final Determination of Write Speed: Each disc's write speed (i.e., 8x, 16x, 32x) depends not only on manufacturer specifications of the disc's maximum writing speed capability, but ultimately on the QUALITY of the disc in combination with the burning software intelligence, and the disc burner type. A product that specifies 16X maximum writing speed burned on a 20X capability Burner could end up writing at 8X due to disc quality, but would not be able to write at 20X because it's beyond the disc's built-in capabilities.

The above image transfer options allow both images and patient data to be sent and received between the Precision Imaging System and a DICOM 3.0 compatible network device or a compact disc / DVD recorder/ player. The archival of images prevents loss as well as keeps the system from becoming full. Additionally, networking allows for images to be retrieved from any station on the network.
Entire Patients, selected Studies or, ShotSaveTM Studies, if they exist, may be selected for transfer. All the patient data will be sent when transferring images.

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NOTE:

Patient Lock
When Patients are actively Importing or Exporting, they are Locked from opening or deleting until the job is complete, then the Patients are Unlocked.

Application Exit Following Transfer Processing
Once the transfer job is complete the application can be exited, but not during processing. When attempting to exit during transfer processing, a Warning Message will display. Following completion, exiting the application is permitted.

Abort
If system should Abort an attempt to Export, data may not be written to the CD / DVD.
Do NOT delete Patients from your system until you have verified the disc directory to see what was successfully burned to each disc, or until the Patient has been successfully archived to a network device.

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9.2. Importing Files

When images are archived to a separate device (central storage network or CD / DVD for example), it is sometimes necessary to bring back (import) the patient files and images to the Precision RXi for review or for comparison with more recent studies.

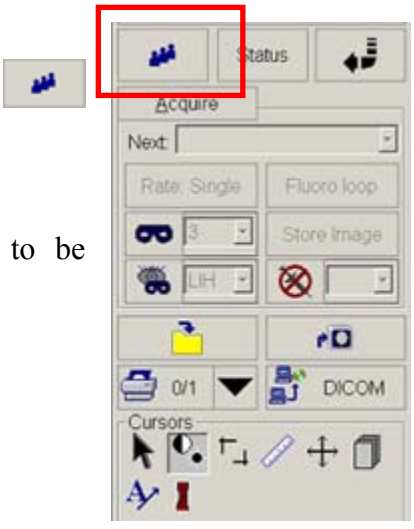
Images can be imported from a network location using a DICOM network connection or imported directly from a DICOM-Compliant CD / DVD using the CD / DVD drive.

As images are received, patient information is also imported, and saved to the Patient Database. If a matching Patient already exists, the images will be appended to the Patient. If no Patient exists, the system will automatically create a new Patient or Study.

If an imported image already exists in the Precision Imaging System database, the data is simply discarded; it will not be stored twice.

NOTE:
Imorting one Patient / Study at a time has the same effect as selecting muliple Patients / Studies for one Import operation.
Before Importing DICOM data from DVD(s), have the Precision Imaging System display the content on the media disc(s). The Precision Imaging System is responsible for interpretting the DICOM file set – where the DICOMDIR gets translated into a three-level Patient-Study-Series GUI representation.

9.2.1. Import From CD or DVD



1 At the Main Image screen, click on the Patient List button to display the Patient List screen.
2 At the Patient List screen, click on the Media Import tab.
A new menu will open (see Figure below).
3 Insert DICOM Compliant Media containing Patient data to be Imported.
4 Select the CD/DVD Media Device name.

NOTE:
Only RF (for General Procedures) and XA (for Vascular Procedures) Modalities are supported.

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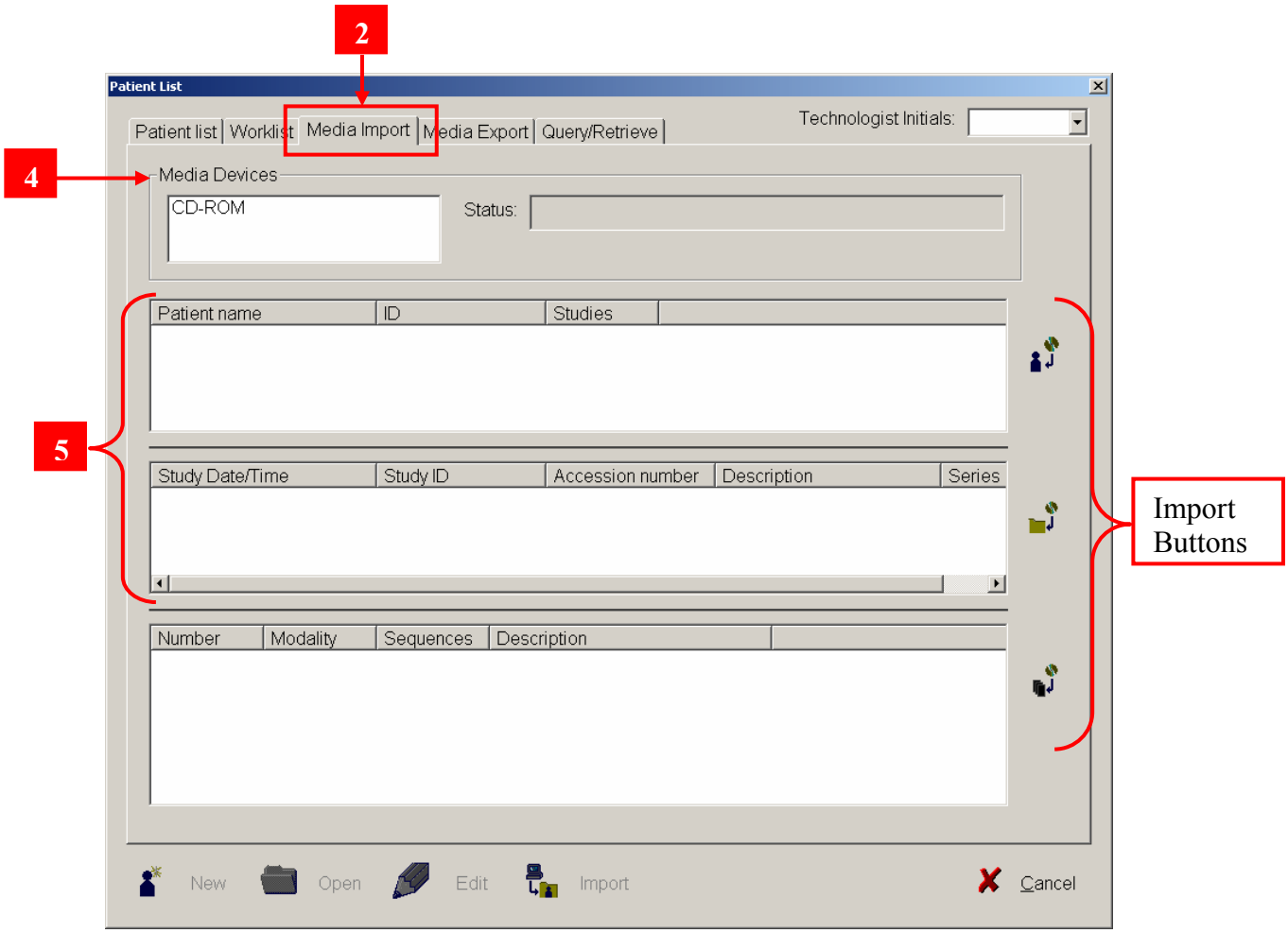

Media Import Screen

5 A list of available files/studies/series will be displayed in the corresponding pane of the Media Import screen.

6 Highlight the Patient, Study, or Series to be imported.

7 Select one of three available import buttons (see chart for descriptions).

BUTTON	ACTION
	Transfers entire patient files from source media device
	Transfers specific studies from source media device
	Transfers specific series from source media device

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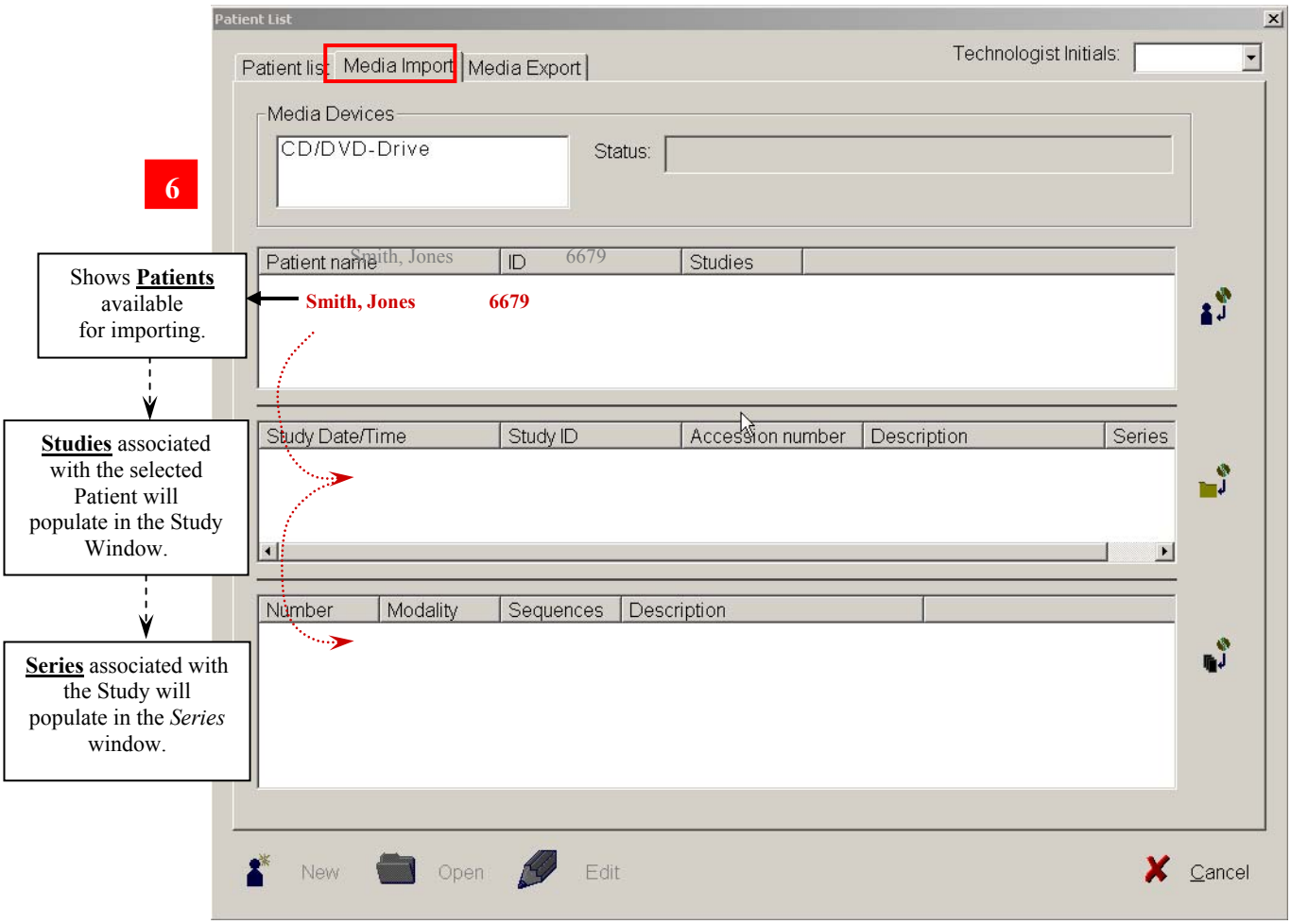

Media Import Results - Patient File Import

=

DICOMIDIR Structure
(Patient / Studies / Series)

8 The System will import the patient information and images from the CD.

9 Select the Patient List tab. The Patient List will now show the recently imported patients.

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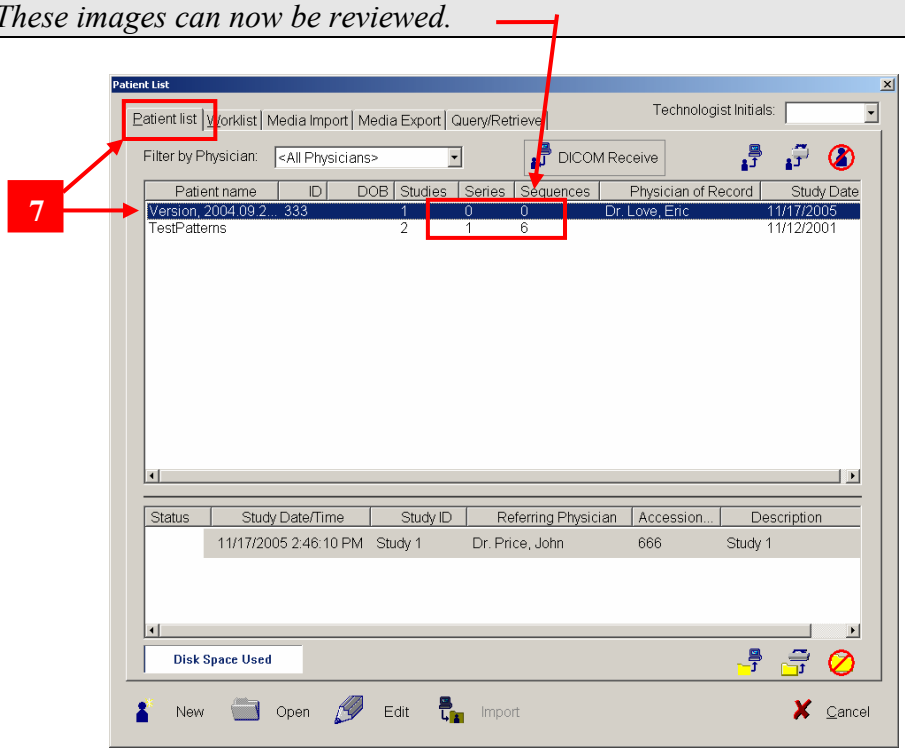
NOTE: *These images can now be reviewed.*



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9.2.2. Import Using DICOM Receive

This feature allows the system to receive images from a DICOM device connected by an Ethernet network.

Once the DICOM Receive function is activated, the system will remain in this mode waiting for files.

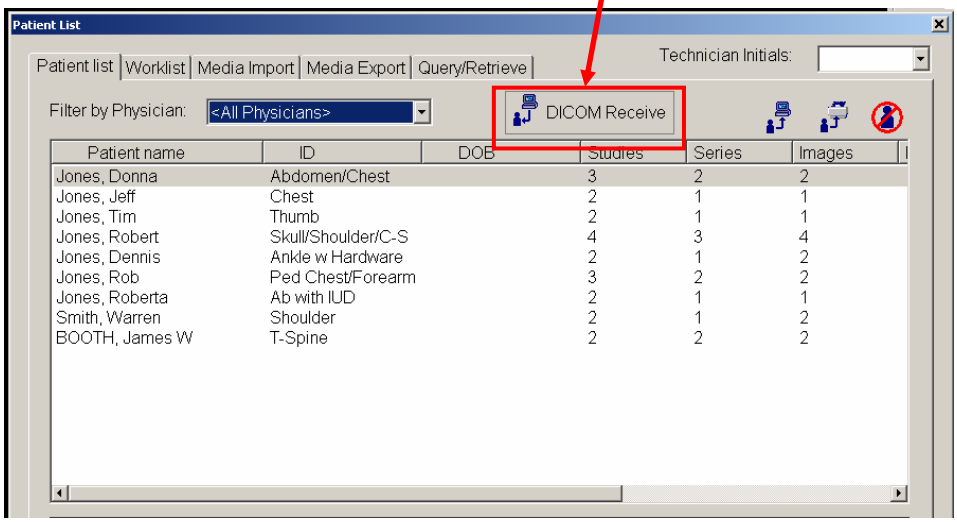
As images are received, patient information is also imported, and saved to the Patient database. If a matching patient file already exists, the images will be appended to the file. If no patient file exists, the system will automatically create a new Patient file or study.

If an imported image already exists in the Precision RXi database, the data is simply discarded; it will not be stored twice.

If an error occurs while the system is importing (database locked, out of disk space, etc.), a Failed message will be sent to the device attempting to send the image to the system.

To use this feature:

1 At the Main Image screen, click on the Patient List button to open the Patient List.
2 At the top of the Patient List screen, click on the DICOM·Receive button.



Patient List Screen

3 The system is now in DICOM Receive mode. The patient files/images can now be sent from the other DICOM device.
4 The patient file information and images will be received and added to the Patient List.
5 Check on the status of the process to see when the import function is complete (see instructions in 9.1.4 - Status Screen).
6 Once a patient file has been added to the Patient List, select the Patient List tab and then select the desired patient file for review.

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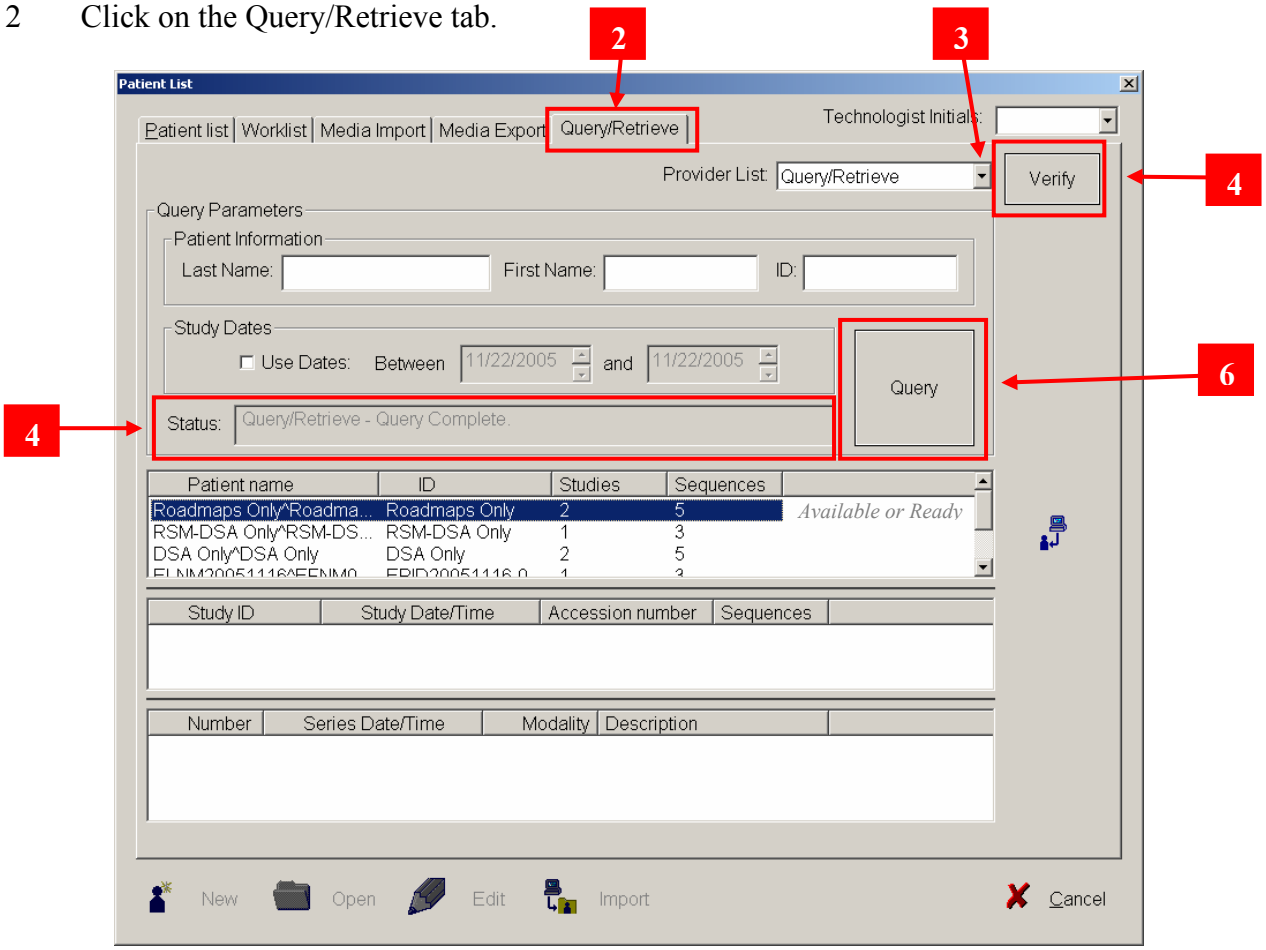
9.2.3. Import Using DICOM Query/Retrieve

This feature allows the system to search DICOM Databases for patient information and images that can be imported into the system via the DICOM Retrieve function. The system acts as a DICOM Query/Retrieve Service Class User to perform this function.

1 Click on the Patient List button to display the Patient List screen.

2 Click on the Query/Retrieve tab.



Query/Retrieve Screen

3 Select the desired Provider from the Provider List Drop-down menu.

4 Click on the Verify button to Verify the Status of the network device. The Status of the device will be shown in the Status box: should be Available or Ready.

5 Enter desired Search criteria – Patient information and/or Study dates.

6 Click on the Query button. The Precision Imaging System will retrieve the Patients from the selected remote device. The Status of this process is shown in the Status box.

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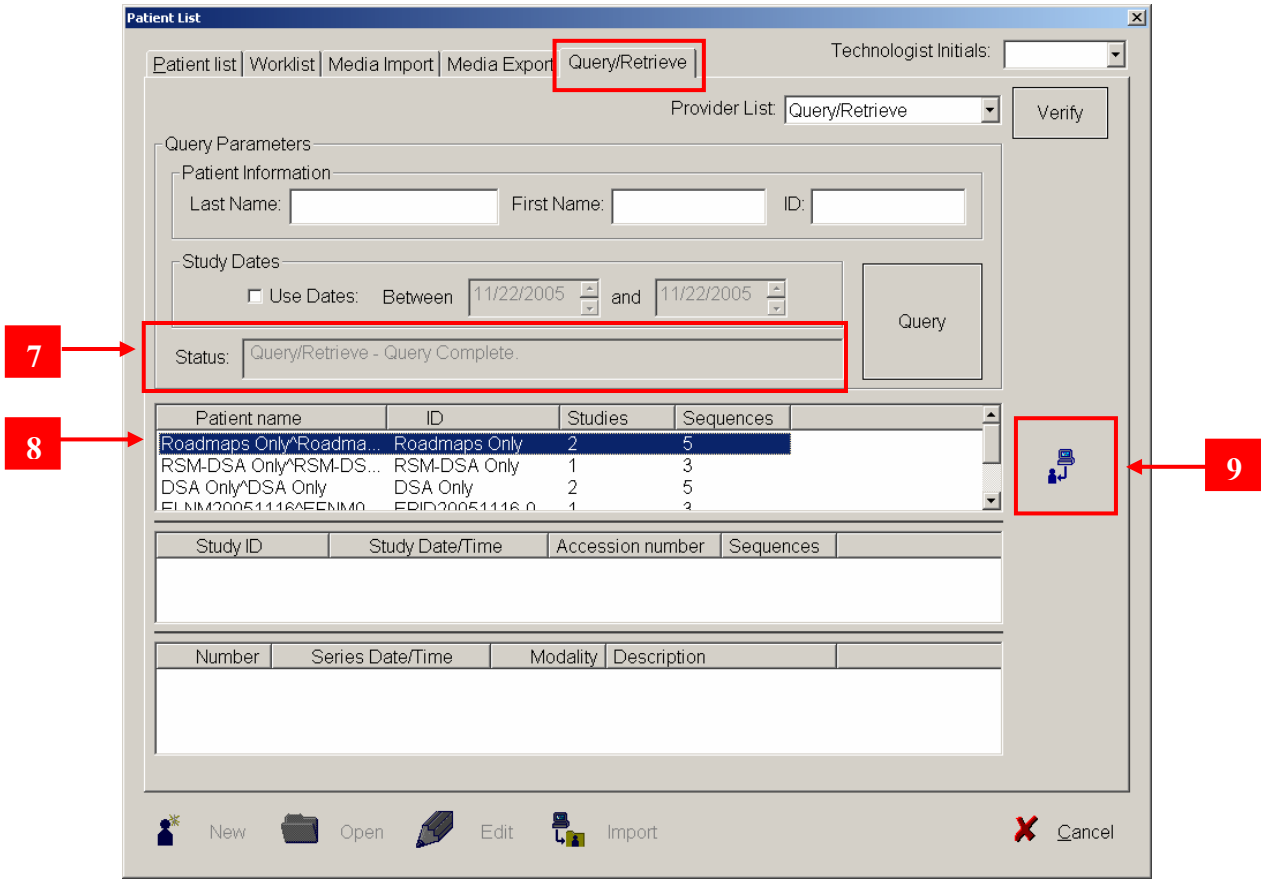
7 When process is complete, the Status box will say "Query Complete," and the Patient Information will be updated in the corresponding panes of this screen.

8 Highlight the desired Patient for Retrieval.

9 Click . When the transfer is complete, the newly retrieved file will be listed in the Patient List. Select the Patient List tab to view.



Query/Retrieve Results Screen

To display Study Information for a selected Patient, double click on the Patient's Name. Related Studies will be displayed in the Study window. Similarly, to display specific Series, double click on the Study Title. The series related to that Study would display.

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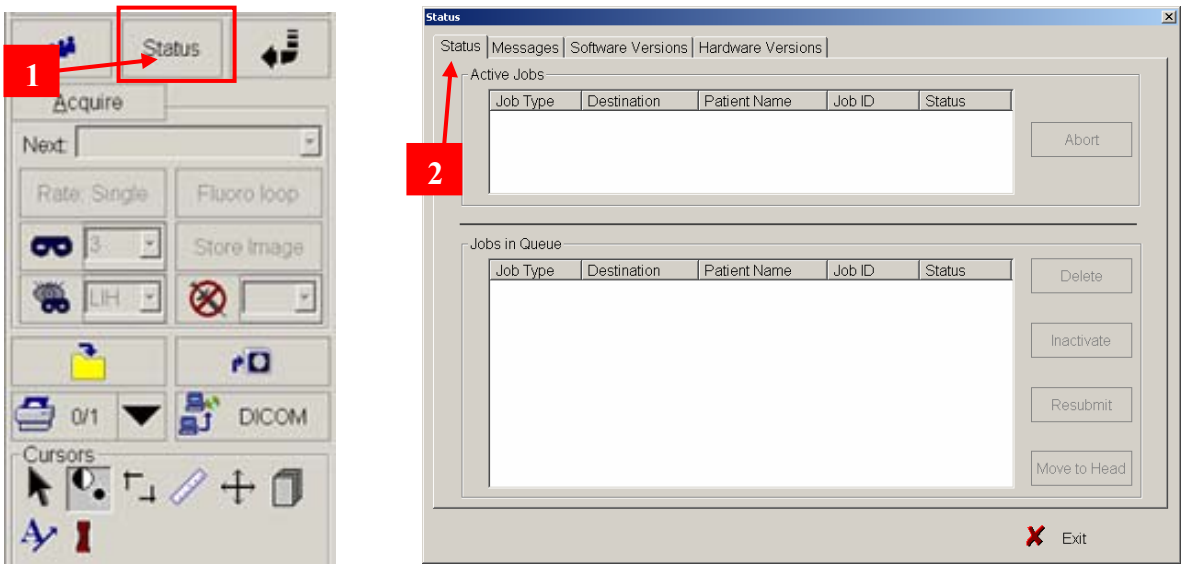
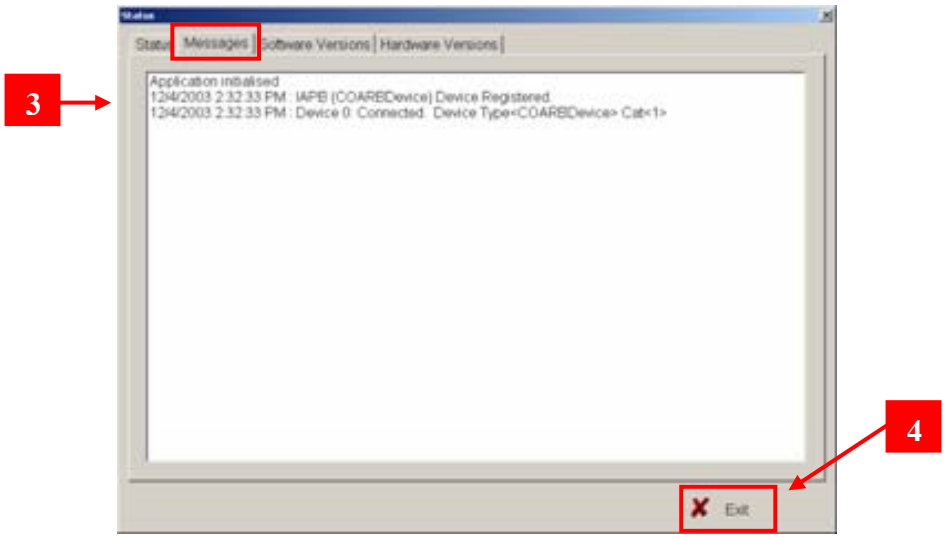
9.2.4. Status Screen

A Status screen is available to verify that the operation has been completed successfully or that the Import is still in progress.

1 At the top of the Main Image screen, click on the Status button. The Status screen will display. The Status tab will be visible.



2 At the Status Dialog screen, click on the Messages tab. The Messages screen will display.



Messages Screen

3 This screen will show the Status of the Import and is updated with each change.

4 When finished, select Exit to Close this window. If Import process fails, try again or contact the Site Network Administrator for assistance.

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9.3. Exporting Files

The Precision Imaging System can send patient data and images to a remote device using the DICOM standard. Typically, data is sent to a DICOM-compliant network device such as a remote PC, a storage server, or Media Device (CD/DVD).

The Precision Imaging System can be configured to communicate with multiple devices. Each device must be entered using the Precision Imaging System Service Applications mode before files can be exported. Contact your Service Representative if the device to which you want to Export is not listed.

Each is described in the following sections:

- Export to a DICOM CD / DVD
- Auto DICOM Send
- Manual DICOM Send
- Send from Patient List
- Export from Thumbnail Image

NOTE:

Export Modality Types
All information about the selected Patients for Export will be exported with STANDARD and PRIVATE Attributes. Private Attributes, or image tags, may not be interpreted correctly or at all by third-party software packages – where the software may only display the originally acquired image without any image enhancements. The image may look differently than displayed with your Precision Imaging System.

Supported Image Modality Types
RF (for General Procedures)
XA (for Vascular Procedures)

Modality Compression
During Media Export, RF and XA images are exported WITHOUT JPG COMPRESSION.
During DICOM SENDS, XA image types apply JPG compression for quicker electronic transfer.

Annotated Image Export
Two Available Methods:
Exporting images without embedding its annotation text.
Exporting images with embedded annotation text;Text becomes part of the pixels that make up the image.
Text Annotations and Pointers will always be exported as Private Attributes with images, but once burned into the image pixels, there is no reverse operation available to delete them.

CAUTION:
Care should be taken to AVOID sending the same Patients / Studies / Images to the same media disc or network device more than once.
If changes have been made to Patient / Study demographic data or image processing changes have been made to existing images, it is recommended that a blank media disc be used for Export or the original Patient should be deleted from the network device prior to Exporting the Patient again.

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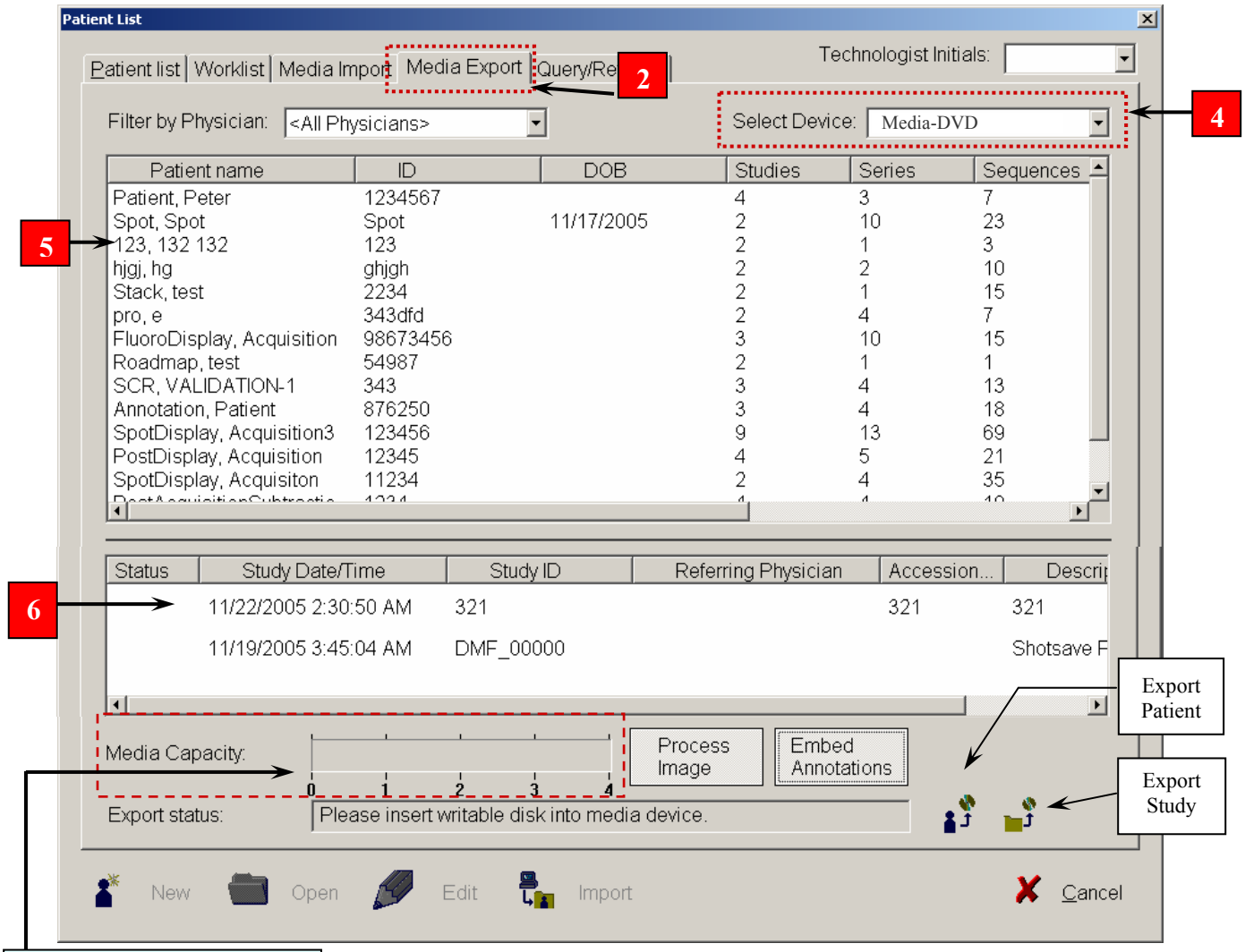
9.3.1. Export to DICOM CD or DVD

1 At the Main Image screen, click on the button to open the Patient List.
2 At the Patient List screen, click on the Media Export tab to open the Media Export screen
3 Insert Media/Disc into drive.
4 Select Device: [Media-DVD] from the Device drop-down menu.
5 Select a single or multiple Patient(s) for Export.
6 Optionally, select single or multiple Studies to be Exported.



NOTE: When no Patients / Studies are selected, Capacity Indicator looks like this.

Patient List Screen – Media Export Tab

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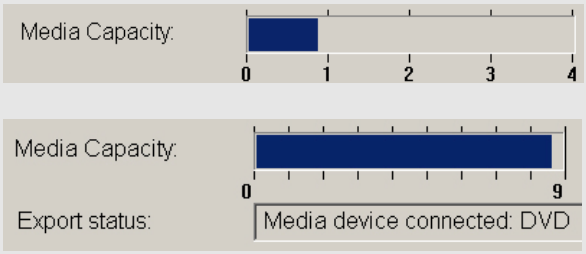
PROCESSING of MULTIPLE DISCS NOTES:

Disc Estimating

The imaging system will provide the user with a total number of DVD / CDs required to complete an export of selected image files (multiple Patients and Studies). Note that the capacity indicator is in relationship to the type of media disc that will be used for the Export (the type currently sitting in the drive), and how many Patients/Studies are selected for the Export. When exporting each Patient, all images acquired for that Patient are Exported.

Typical indications for Exports requiring multiple-discs:



ATTENTION:

The Media Capacity Indicator is ONLY a ROUGH ESTIMATE of discs required; Your Export may require more discs. Export processing capacity is limited by the available Hard Drive space in combination with media type used for the Export.

Example: The 0 through 9-disc display shows the user 9 discs will be needed to complete the Export request; however, be prepared to utilize additional discs if required. The system will continue to prompt you to insert another disc to complete the export.
See Paragraph Media Export Capacity in this Section for more information.

Writing Multiple Discs

During an Export requiring the writing of multiple discs, as each required disc completes, the disc will be automatically ejected and an "insert new media" message will display. This indication will remain displayed until the next disc is inserted into the drive.

Utilizing Disc Space from Previously Burned Media/Discs for other Export Jobs

The first disc is allowed to already contain image data. All subsequent discs for this Export Job are required to be empty.

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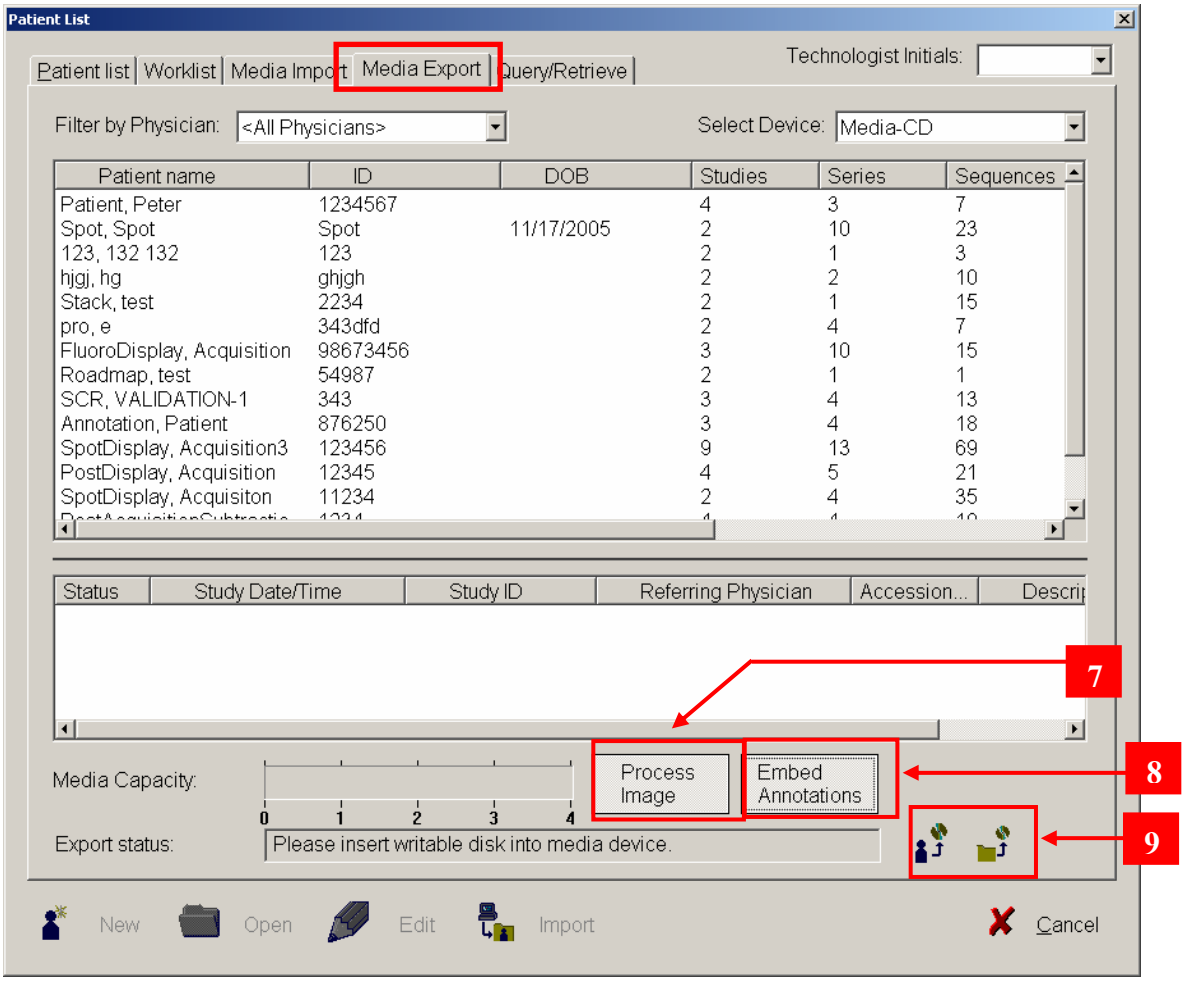

Media Export Screen

7 To have Processing Features (previously applied to the images, such as Edge, Brightness, Contrast adjustments, etc.) burned into the exported images, select the Process Image button.

8 To have Text Annotations or Pointers burned into the exported images, select the Embed Annotations button.
(Note: This option is only available if Process Image is active. This EMBEDS the Annotations and Pointers into the images pixels as a permanent part of the image, and cannot be removed after Export;)

9 Select either Export Patient button to export the entire Patient, or select the Export Study button to Export the selected Study.

10 A Transfer Job is created and added to the Queue. See Paragraph 9.3.7 Job Queue Export Processing in this Section for more information.

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9.3.1.1. Exporting Unprocessed Images

Some Processing Attributes used by the Precision Imaging System are Exported as PRIVATE Attributes, and are unknown to third-party software. Private Attributes will NOT be applied to unprocessed images upon display on systems other than the Precision Imaging System.See Paragraph 2. – Exporting in this Section for more information regarding Modality Types, Modality Compression, Exporting Annotated Images.

9.3.1.2. Media/Disc Export Notes

- If the selected patient is too large to Export, the Export Patient button is Disabled. If the number of studies is too large to Export, the Export Study button is Disabled.
- If a Patient does not contain any images, it will not be displayed in the patient listing in the Media Export Pane. Similarly, if a Study does not have any images, it will not be displayed in the Study List in the Media Export Pane.
- If a Patient File includes a Print ShotSaveTM folder, it will not be displayed in the Patient Media Export Pane. The Print ShotSaveTM Folder cannot be exported. Additionally, the image count for the patient will not include the images in the Print ShotSaveTM Folder.

Receiving a DISK ERROR Message
If a disc is removed from the Media Device, an Error Message displays. If a disc is not inserted in the drive, or the inserted disc is not writable, a Message displays indicating the situation. If there is not enough current available hard drive space for processing the selected Patients/Studies, an Error Message displays notifying user to reduce number of Patients/Studies currently selected, or delete patient records from the system hard drive to free up space.

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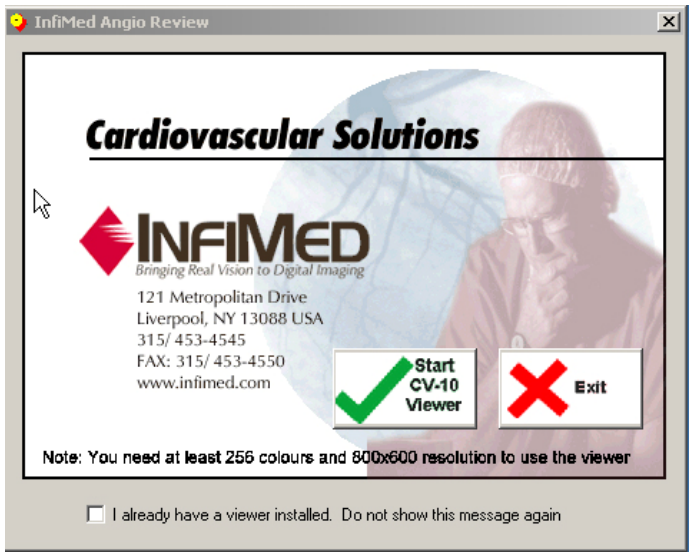
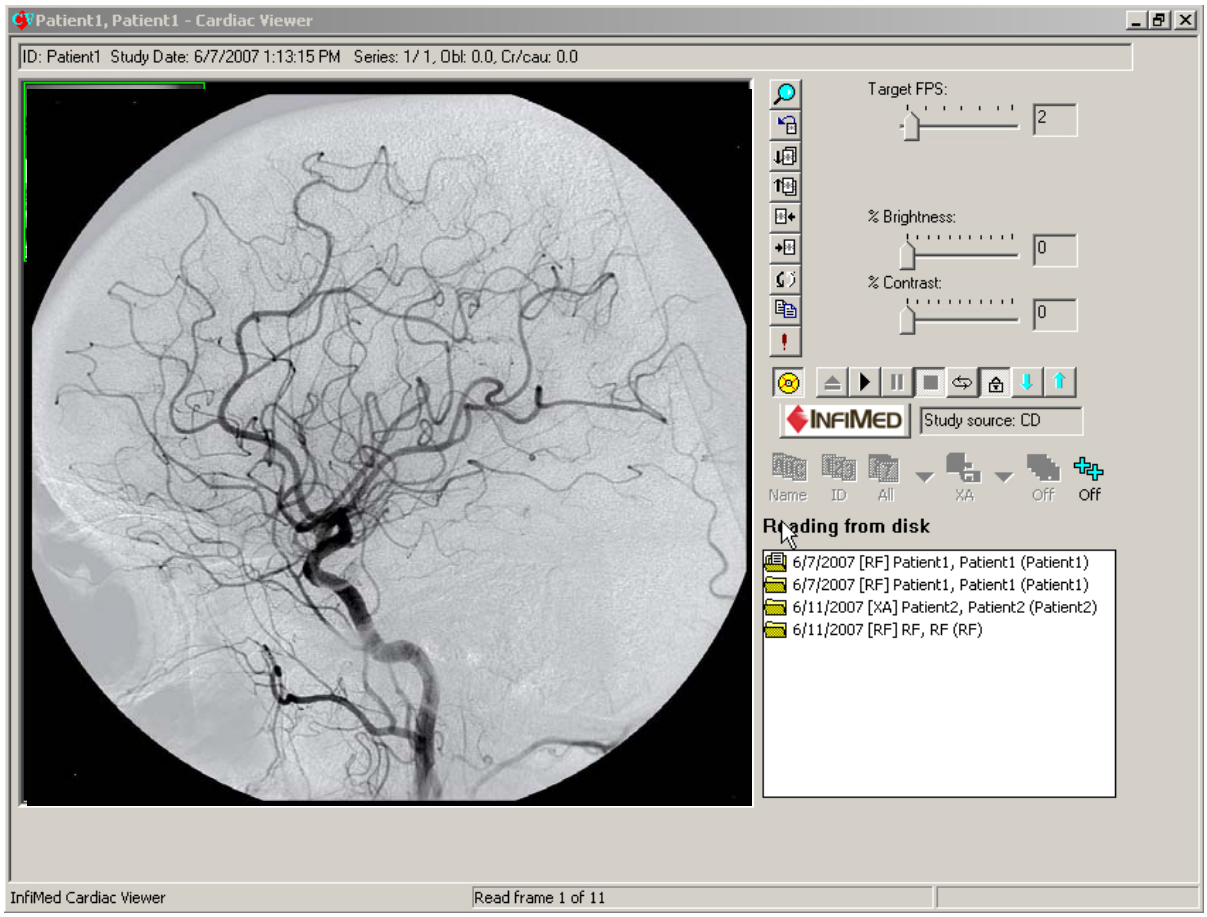
9.3.2. CV-10 DICOM Viewing Software

Viewing CD/DVD Exported Patient Images without a Clinical Application or PACs Workstation:
The Cardiovascular Solutions CV-10 Viewer software tool is provided on each DICOM Media disc that is burned through the Precision Imaging System for viewing the files from any PC that has a CD/DVD drive.
Always review folders under the "Reading from Disk" Window to verify all data transfers were successful before deleting Patients from your imaging system.


InfiMed Angio Review
Cardiovascular Solutions
INFIMED
Bringing Real Vision to Digital Imaging
121 Metropolitan Drive
Liverpool, NY 13088 USA
315/ 453-4545
FAX: 315/ 453-4550
www.infimed.com
Start CV-10 Viewer
Exit
Note: You need at least 256 colours and 800x600 resolution to use the viewer
I already have a viewer installed. Do not show this message again



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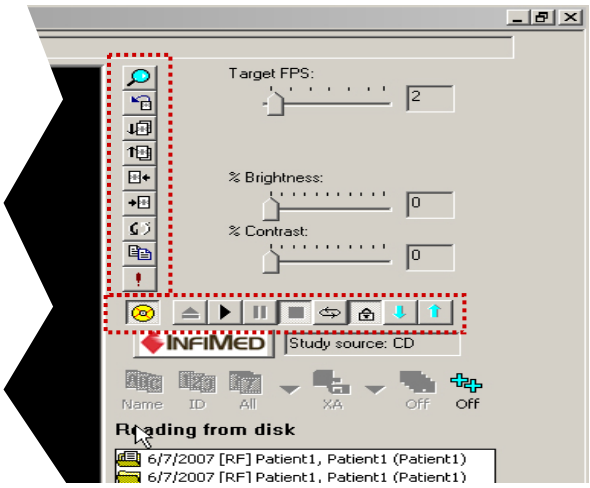

Basic CV Viewer Functionality

The Main Image Display portion of the screen shows the current image frame. The display parameters for this image can be changed using the Toolbar and Slider controls (Brightness, Contrast, or Target Frames per Second).

The Toolbars allow access to commonly used functions of the Viewer program. For a quick explanation of a button's function, move the cursor over the button to display a short functional description. When a Toolbar option is unavailable and disabled, it will appear gray.

MAIN and EXTRAS Toolbar Functionality:

MAIN Toolbar Functionality:

TOOL	FUNCTION
	Open Study from CD. It may take a few seconds to read the patient information from the disc. Once the Patient is loaded, the Icon Box will show the sequences available and the first sequence will display.
	Eject CD. This will close the current study and eject the CD.
	Play. This button will start or restart a sequence playing.
	Pause. This button will pause the current sequence. Pressing the button again will recommence reading or looping.
	Stop. This button stops the current sequence reading or looping.
	Loop. If this button is pressed while a sequence is loading, the sequence will load to the end and then repeat all the frames stored in memory.
	Loop lock. Setting loop lock has the same effect as pressing the loop button every time a new sequence is loaded.
	Icon page up/down. These buttons move the sequences in the icon list up or down a page.

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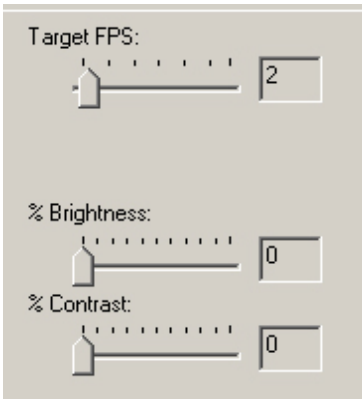
EXTRAS Toolbar Functionality:

TOOL	FUNCTION
	Zoom. Click and drag mouse cursor over various image locations to magnify that area.
	Reset the display to the Default values.
	Select the next sequence.
	Select the previous sequence.
	Select the previous frame.
	Select the next frame.
	Invert gray level (black becomes white, etc.)
	Copy current frame to Windows clipboard as a bitmap; then paste into another program (for example to produce slides).
	Displays the Configuration dialog.

Slider Controls



Clicking on the slider icon and dragging the mouse will change the feature value. The current value for the icon will display in its value box on the right.

Target Frames Per Second (FPS) Slide

The Target FPS shows the intended display rate (frames per second). If your system can read or display fast enough, the current sequence will display at this rate. The Target FPS Slider is reset to the acquisition rate when you select a new sequence.

Brightness and Contrast Sliders

The Brightness and Contrast Sliders control the grayscale display of images. Adjust these sliders to correct for under-exposed frames. The Brightness and Contrast features can also be adjusted by clicking and dragging the mouse while the cursor is over the Main Image Display. To reset the Brightness and Contrast settings to the defaults (as set in the Configuration window), click on the icon in the Toolbar. Double clicking the mouse while the cursor is over the Main Image Display will select an optimized Brightness and Contrast Level for the current image frame.

Database Filters – Sort / Search Capabilities

= Filters Database Files by Name.
Files arranged in chronological order.

= Filters Database Files by a Patient ID.
Files arranged in chronological order.

= Displays ALL files in chronological order.

= Filter Off

NOTE:
Dimmed Display = Function Not Available

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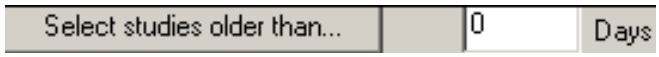
= Expand Database File

= Database Date Filter; use the pull-down list to chose a specific date; A calendar will appear:

Select specific date to display all associated files.

- Use arrows to change months.
- Several pre-programmed date filters: All dates, Today, Yesterday, Last Week, etc.
- Files can be filtered prior to a certain date by using



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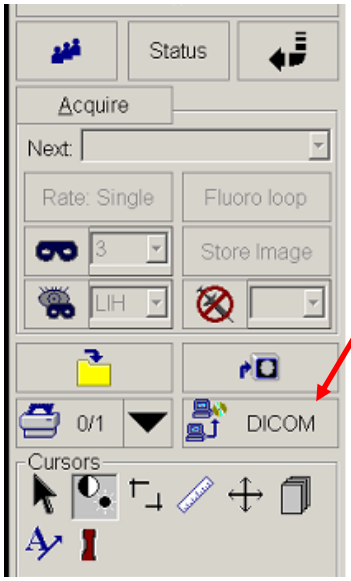
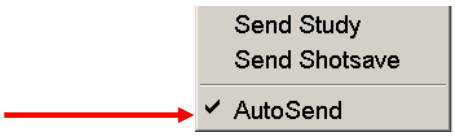
9.3.3. Auto DICOM Send

DICOM Send is a function of transferring patient data and images to a DICOM-compliant device. Auto DICOM Send refers to an automated process where each image that is acquired and stored to the system's database will automatically be sent to the preferred DICOM Destination (also configured as a Doctor Preference).

Turn this feature ON/OFF for the current patient file by using the following procedure.



1 At the Main Image screen, click on the DICOM button
2 A short DICOM sub-menu will be displayed.
3 If AutoSend is active, a check mark (✔) will appear next to AutoSend.



4 To disable the function, click on the text. The check mark will be deleted and the function disabled.
5 To re-activate, simply repeat steps to select text.
6 The patient file will remain open, and images can be acquired normally. See part 9.2.6 and 9.2.7 for information on the status of the exported images.

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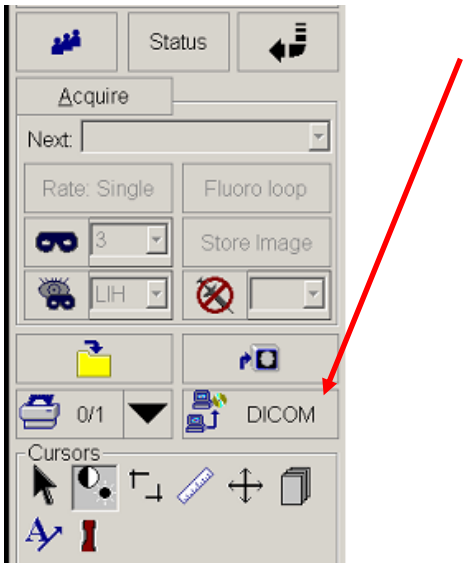
9.3.4. Manual DICOM Send

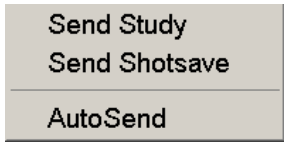
DICOM Send is a function of transferring patient data and the corresponding images to a DICOM-compliant device.

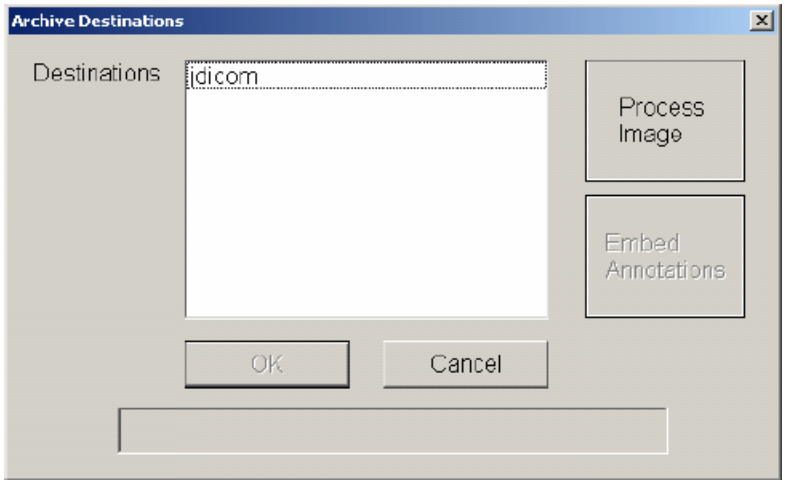
Manual DICOM Send refers to the process of selecting a patient file and images to be sent, as opposed to Auto DICOM Send (see part 9.3.3 above).

Images will be sent to the selected DICOM device. In order to use this function, a Patient File with images must be open and displayed on the Main Image screen.



1 At the Main Image screen, click on the DICOM button.
2 A short DICOM sub-menu will be displayed.
3 Select either Send Study or Send Shotsave.
4 The Archive Destination screen will be displayed.





Archive Destination Screen

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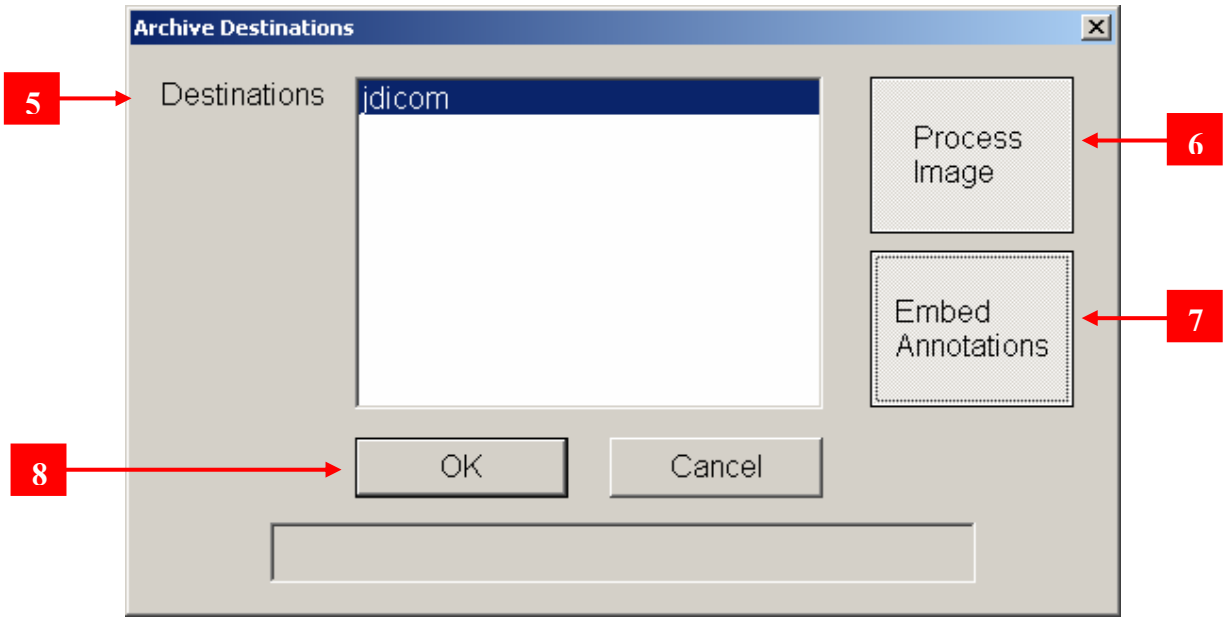

Archive Destination Screen

5 Click on the desired Destination from list of those available.

6 To include any processing features previously applied to the images, (such as Edge, Brightness, Contrast adjustments, etc.) with the exported images, select the Process Image button.

7 To include any text annotations or pointers with the exported images, select the Embed Annotations button.

8 Click on the OK button to send the images.

NOTE:

See part 9.3.7 of this section for an explanation of how exported files are queued for exporting.

See part 9.3.8 following here for instructions on how to check the status of the file transfer.

Once the Manual DICOM Send process is complete, the patient file will be closed.

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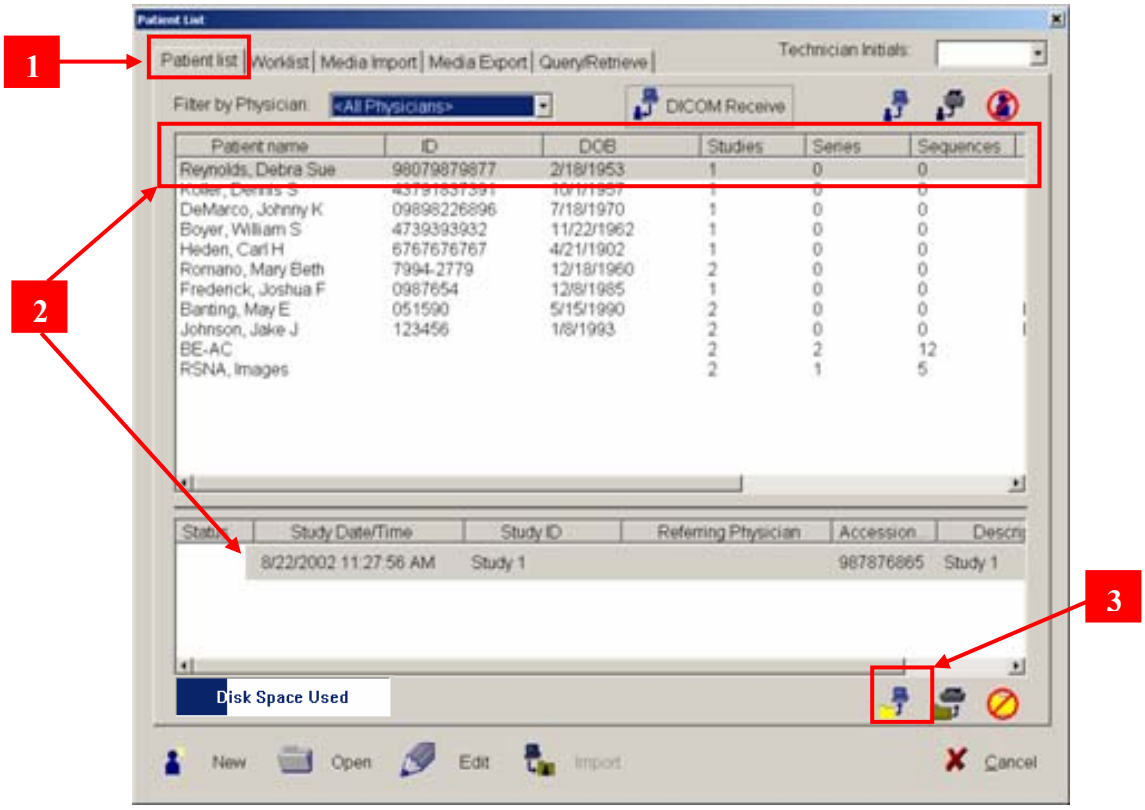
9.3.5. Exporting From Patient List

While at the Patient List, select a specific patient file, study or series to be exported to a specified DICOM destination.

1 Click on the Patient List button to display the Patient List screen.



2 Highlight the desired patient file – or - highlight a specific study
3 Click on the desired DICOM Send button.

	Sends entire Patient file to selected DICOM destination.
	Sends specific study to selected DICOM destination.

4 The Archive Destination screen will be displayed.

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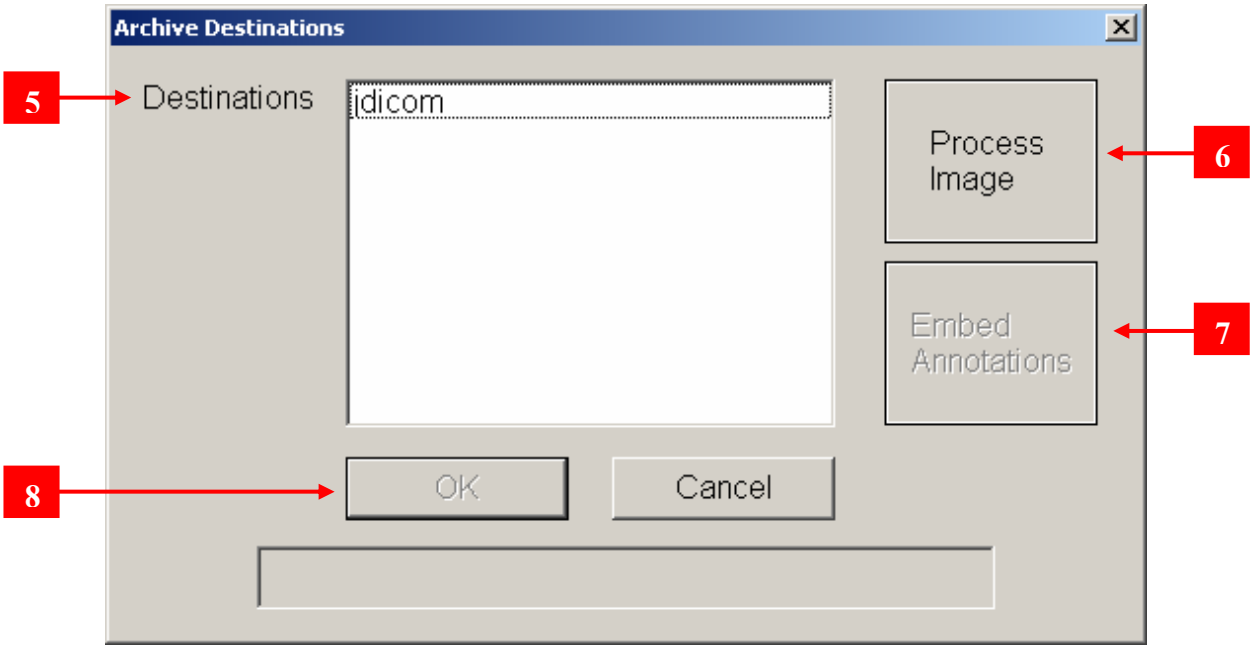

Archive Destination Screen

5 Click on the preferred Destination from list at this screen.

6 To include processing features previously applied to the images, (such as Edge, Brightness, Contrast adjustments, etc.) with the exported images, select the Process Image button.

7 To include text annotations or pointers with the exported images, select the Embed Annotations button.

8 Click on the OK button to export the images.

NOTE:

See part 9.3.7 of this section for an explanation of how exported files are queued for exporting.

See part 9.3.8 following here for instructions on how to check the status of the file transfer.

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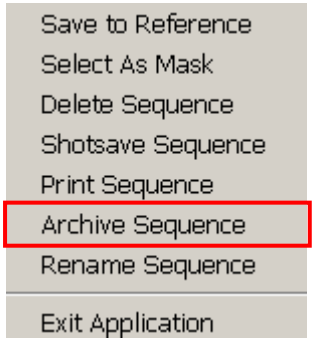
9.3.6. Exporting from Thumbnail

Image sequences can be sent to a DICOM destination directly from an Image Thumbnail.

In order to perform this function, a patient file with images must be open at the Main Image screen.

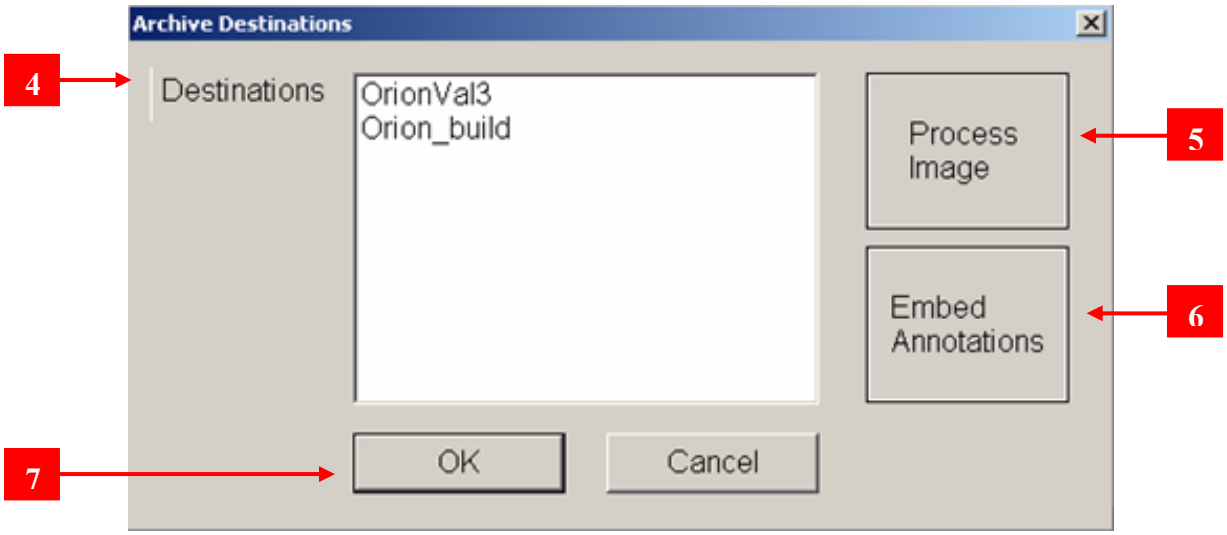
1 Right-click on the same Thumbnail to open the Thumbnail sub-menu.



Thumbnail Sub-Menu

2 Click on the Archive Sequence option.

3 The Archive Destination screen will appear showing all possible destinations.



4 Click on the desired Destination from list at this screen.

5 To include processing features previously applied to the images (such as Edge, Brightness, Contrast adjustments, etc.) with the exported images, select the Process Image button.

6 To include text annotations or pointers with the exported images, select the Embed Annotations button.

7 Click on the OK button to export the images.

NOTE:
See part 9.3.7 following here for an explanation of how exported files are queued for sending.
See part 9.3.8 following here for instructions on how to check the status of the file export.

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9.3.7. Job Queue Export Processing

Each Export Request is handled separately. The system takes each Export Request in the order the request was made and puts them in a Job Queue, or an ordered list.

When an Export Request comes to the head of the Job Queue, a Temporary Folder is created on the hard drive that contains all the necessary DICOM information including: Image Data, Patient Data, and the DICOM Modality type. This helps protect the original file/image data.

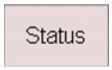
As images are written to the Temporary Folder, Status Messages indicating the progress are shown on the Status screen. When all of the data for that Patient has been written to the Temporary Folder the contents of that folder is then Exported to the selected

9.3.7.1. Aborted Files in the Job Queue

If an Export transfer fails, the Export Request is labeled Aborted and moved to a separate Inactive Queue. The system stops trying to send the Aborted Job and moves on to the next Export Request in the Job Queue.

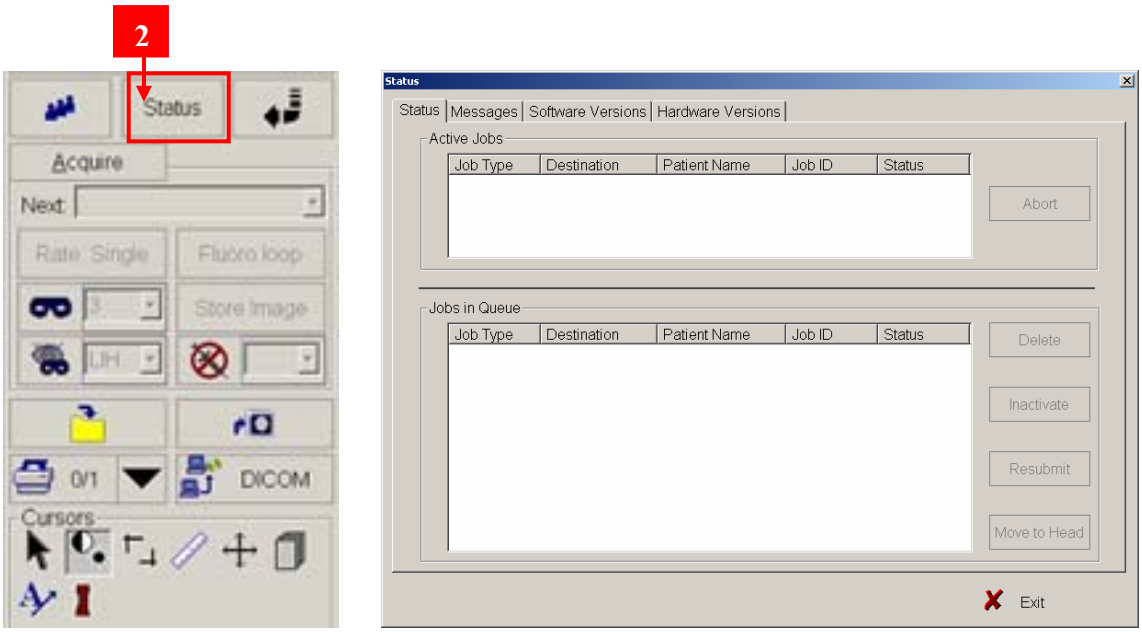
9.3.8. Transfer Status

A Status Messages screen is available from the Main Image screen.

1. At the Main Image screen, click on the 

button.
The Status screen will display.

2. At the Status Dialog screen, click on the Messages Tab.
The Messages window will display



Status Screen

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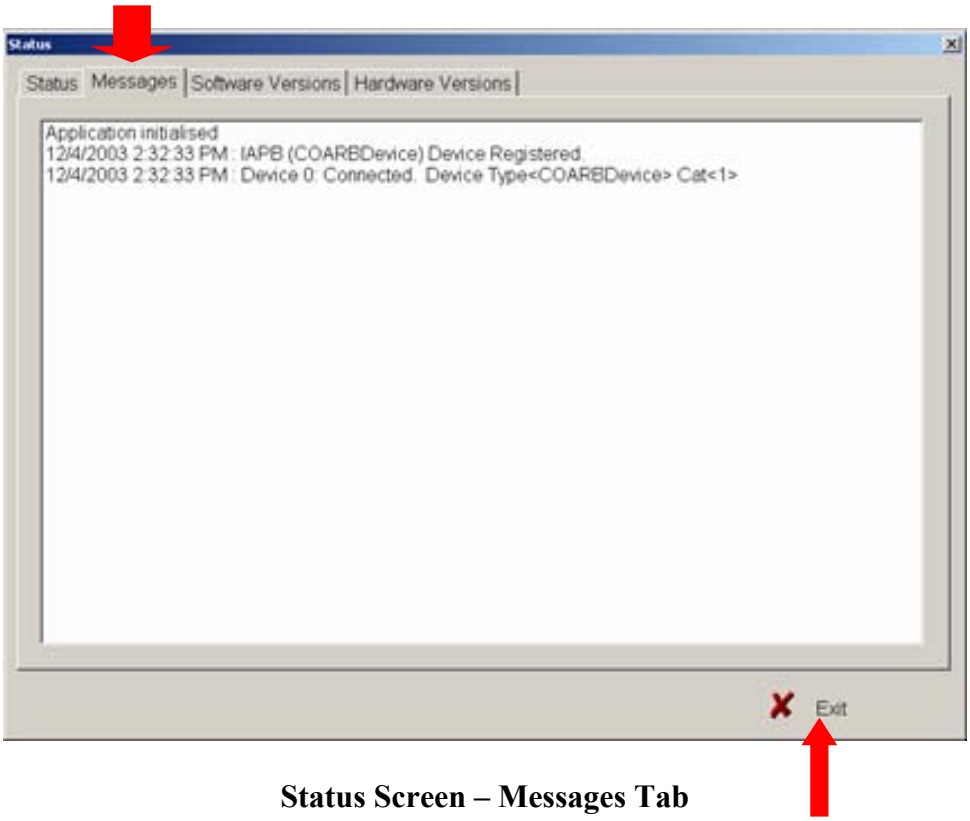
3. The Messages window shows the exact Status of the current transfer operation and is updated with each change.



Status Screen – Messages Tab

4. When finished, select Exit to Close this window. If Import process fails, try again or contact the Site Network Administrator for assistance.

JOB QUEUE NOTES:

Export Job Control –
An active job can be aborted with the exception of a Media Job that is actively burning to the Media Device. There is only one job active at a time while others are waiting in the job queue.

Jobs in the pending queue can be deleted, inactivated, resubmitted, or rearranged within the queue.

Each Export operation creates an Export Job and is displayed in the Job Queue's Status Window.

For more Detailed Status Information –
See the Default.log and/or StatusMsg.log files.
They are very helpful to diagnose why the job transfer had problems.

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9.4. Windows® Image Formatting

Images on the Precision RXi System can also be shared between non-DICOM computers (for use in a web page, Word® document or other Windows® application, etc) or "burned" on a CD / DVD using the NERO® 7 Essentials software (or Roxio CD Creator®) provided with your system (see next section for instructions).

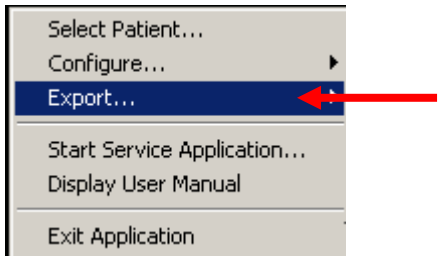
Images can be exported in a variety of formats such as BMP, JPEG or AVI format.

9.4.1. BMP (Bitmap)

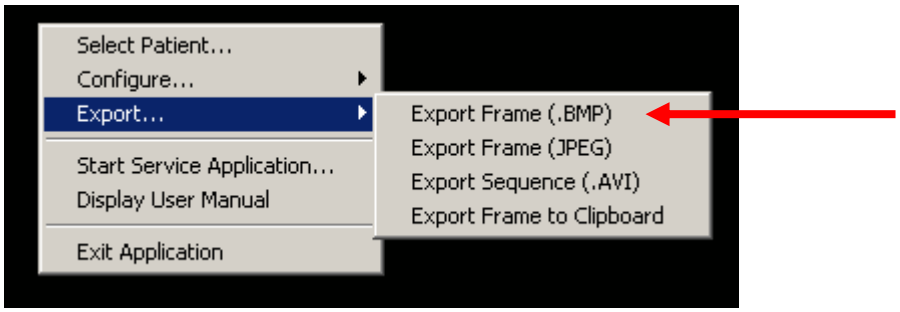
BMP is the standard bit-mapped graphics format used in the Windows environment. By convention, graphics files in the BMP format end with a.BMP extension.

To select this feature for a specific image frame (not a sequence):

1 Rick-click the mouse while the cursor is over the image portion of the screen. The Right-click menu is displayed.



2 Select Export. The Export sub-menu is displayed.



3 Select Export Frame (.BMP).
4 A new screen appears, called, File Save As.
5 At this new screen, select a directory folder where you want to save the file, enter a filename, then click the SAVE button.

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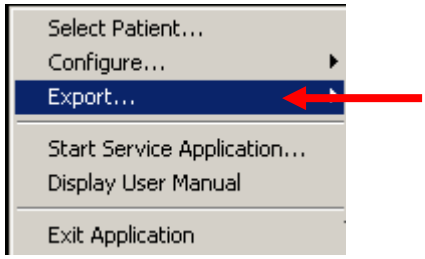
9.4.2. JPEG

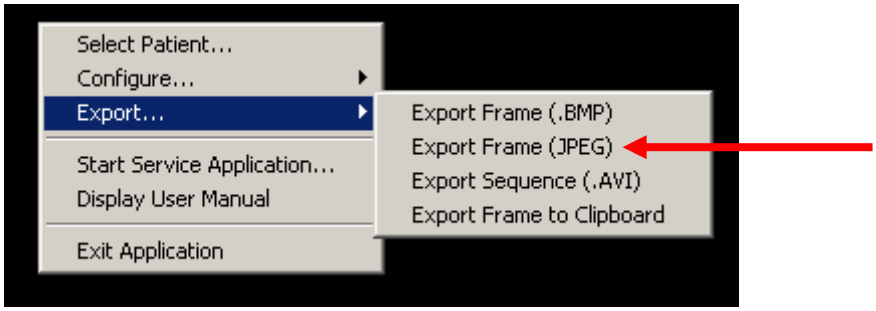
Short for Joint Photographic Experts Group, the JPEG file format is a compressed format. Although it can reduce files sizes to about 5% of their normal size, some detail is lost in the compression.

To select this feature for a specific image frame (not a sequence):

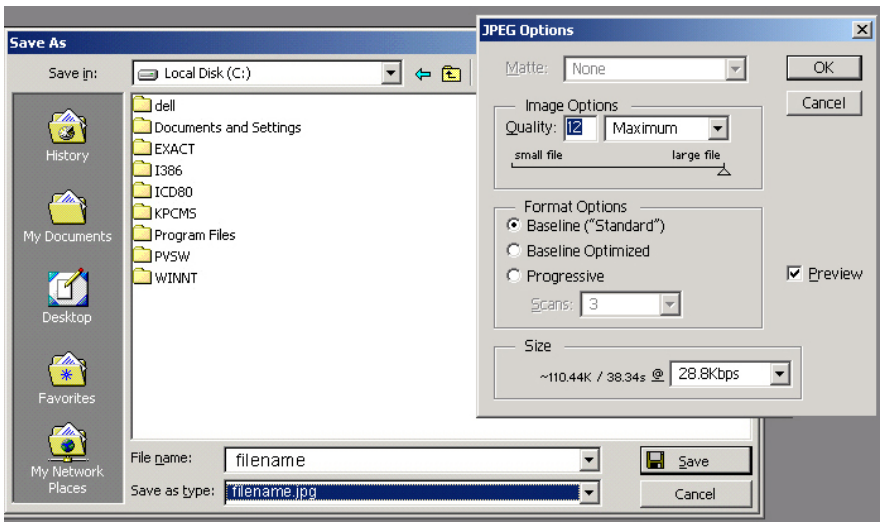
1 Rick-click the mouse while the cursor is over the image portion of the screen. The Right-click menu is displayed.



2 Select Export. The Export sub-menu is displayed.



3 Select Export Frame (JPEG).
4 A new screen appears, called, File Save As.
5 At this new screen, select a directory folder where you want to save the file, enter a filename, then click the SAVE button.



NOTE:

The JPEG Options screen is shown for your reference only.

This screen will not show as you are saving; however, the file will get saved as a Baseline (Standard) format with a maximum image quality level of 12.

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9.4.3. Export Sequence in AVI Format

The AVI Movie (Audio Video Interleave) format is a common format on PC's, and comes with the Windows® operating system. The format is used for video formatting. It captures a Series of images for dynamic Replay. AVI movies can be played on any computer system using a Windows® operating system.

Any sequence of images saved onto a hard disk during an exam can be exported later as an AVI format movie.

Recording an AVI Movie (or single images in bmp/jpeg format) cannot be executed during live acquisition (during the patient exam). AVI movies are obtained only from images saved onto the hard drive during the previous activity of diagnosis.

AVI movie quality characteristics are selectable by the user; Available options are:

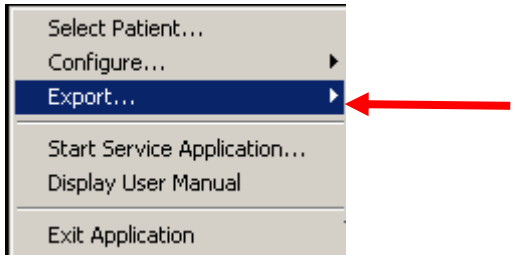
1024 x 1024 x 8 bits
512 x 512 x 8 bits
256 x 256 x 8 bits

It is possible to reduce the resulting AVI movie by selecting the option "Use Compression". The compression option is expressed in a percentage of the original image quality. Utilizing a compression algorithm causes the image to lose resolution/pixel depth, therefore reducing file size and image quality.

WARNING:
The ONLY format that preserves image quality is a DICOM format, and should be the ONLY format used in a Clinical environment. Converting the original image into any other format reduces image quality and should be avoided.

To select this feature for the current sequence of images:

1 Right-Click the mouse while the cursor is over the image portion of the screen. The Right-click menu is displayed.



2 Select Export. The Export sub-menu is displayed.

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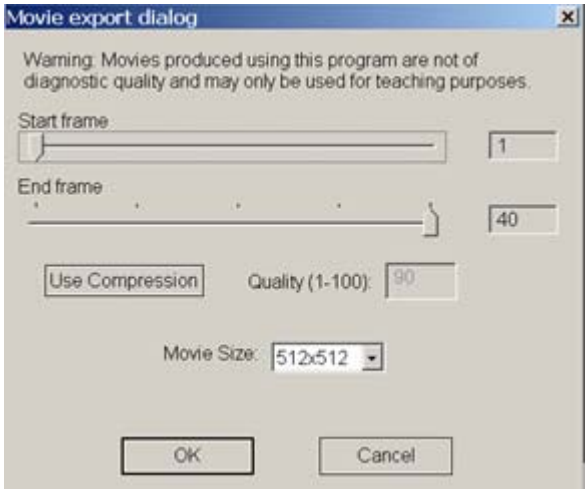
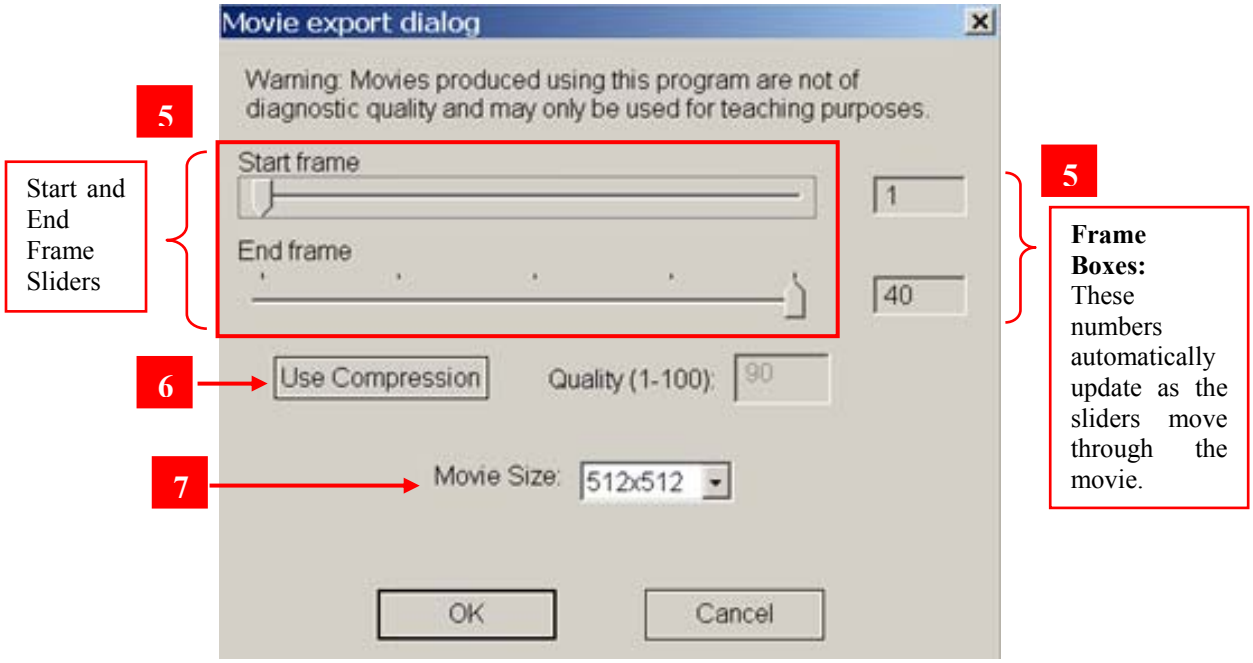
3 Select Export Sequence (.AVI).

4 A new screen appears called, Movie Export (see Figure below). Use this screen to customize the image sequence being created.





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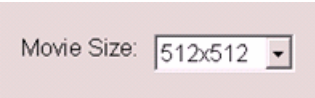
5. FRAME SLIDERS: use the Start Frame and End Frame sliders to quickly select a starting frame and end frame for the sequence to be exported.
For more precise settings, enter the exact frame number in the Frame box for the starting and ending frames of Sequence to be exported.

6. COMPRESSION: compress the Sequence of images or leave them uncompressed. Compression reduces the overall disk space needed to store the Sequence but is accomplished by sacrificing some image quality.

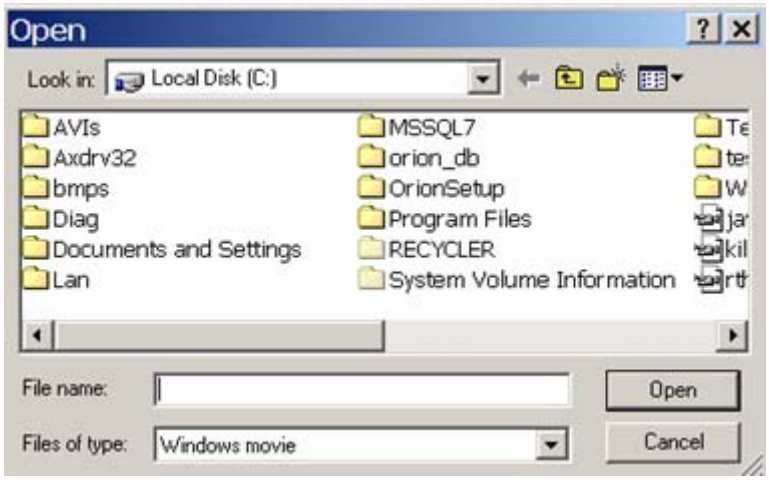
To compress the image click the Use Compression button, then use the keyboard to enter a Compression Percentage in the box.
Range is 1-100.
The Percentage indicates the amount of Compression. Thus if 90% is entered, the file is compressed by 90%, sacrificing a lot of image quality but getting the file down to a very small size. Alternately, entering 10% will only compress the file by 10% and save much of the image quality.
The proper amount of Compression depends on how big the Sequence of images is and the quality of the PC that will be used for viewing the Sequence.

7. MOVIE SIZE: Select the Movie Size using the Drop-down menu:



8. Click OK to save the settings and create the selected Sequence of images for Export. The Movie Export setting screen disappears, and a new screen appears (see Figure below).

9. Select the desired location to which to Export the Image Sequence, and then click the Open button. The file will be saved to that location, this small window will Close, and the system will return to the Main Image display.



AVI Export Location Screen

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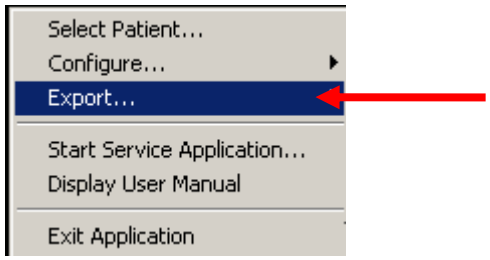
9.4.4. Export Frame to Clipboard

This feature allows the current image to be exported to the clipboard (temporary storage used in Windows® systems). The image can then be pasted into an existing word document or HTML file.

To select this feature for a specific image frame (not a sequence):

1 Right-Click the mouse while the cursor is over the image portion of the screen. The Right-click menu is displayed.



2 Select Export. The Export sub-menu is displayed.

3 Select Export Frame to clipboard.

4 The image is saved on the clipboard of the Precision RXi system and can be pasted into another windows type document or HTML file open on the system.

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9.5. Creating CDs with Roxio Easy CD Creator ®

WARNING:
MAKE REFERNCE TO THIS SECTION ONLY IF YOU HAVE A DIGITAL PC WITH CD WRITER DEVICE.

One of the accessories provided with your system is the ***Roxio Easy CD Creator ®***. Use this software to quickly copy images file from your hard drive directly to CD.

Follow these steps to burn CD's using Roxio CD Creator:

1 Place a blank CD-R or CD-RW in the CD recorder tray.

2 Click the Start button on your desktop.

3 Select Programs/Roxio Easy CD Creator/Applications/Easy CD Creator

4 Click on Easy CD Creator and the "*Select a Project*" screen will be displayed.

5 Position the cursor over "Make a Data CD"

This screen will go "live" and the screen will change displaying the various data CD options available.

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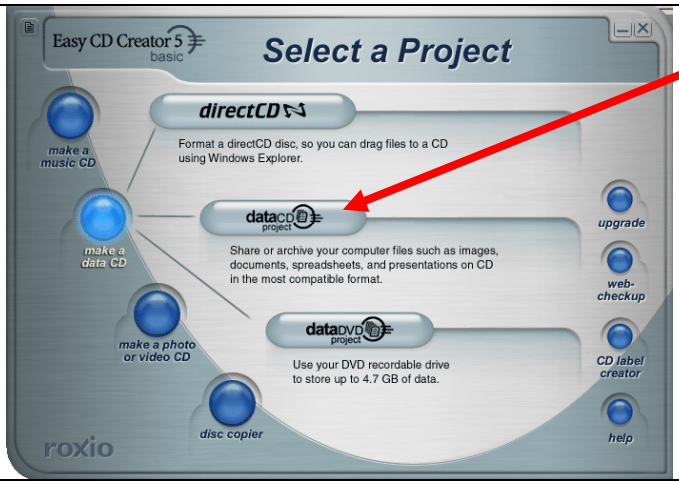
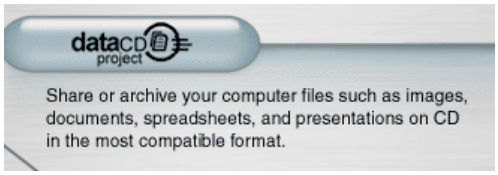
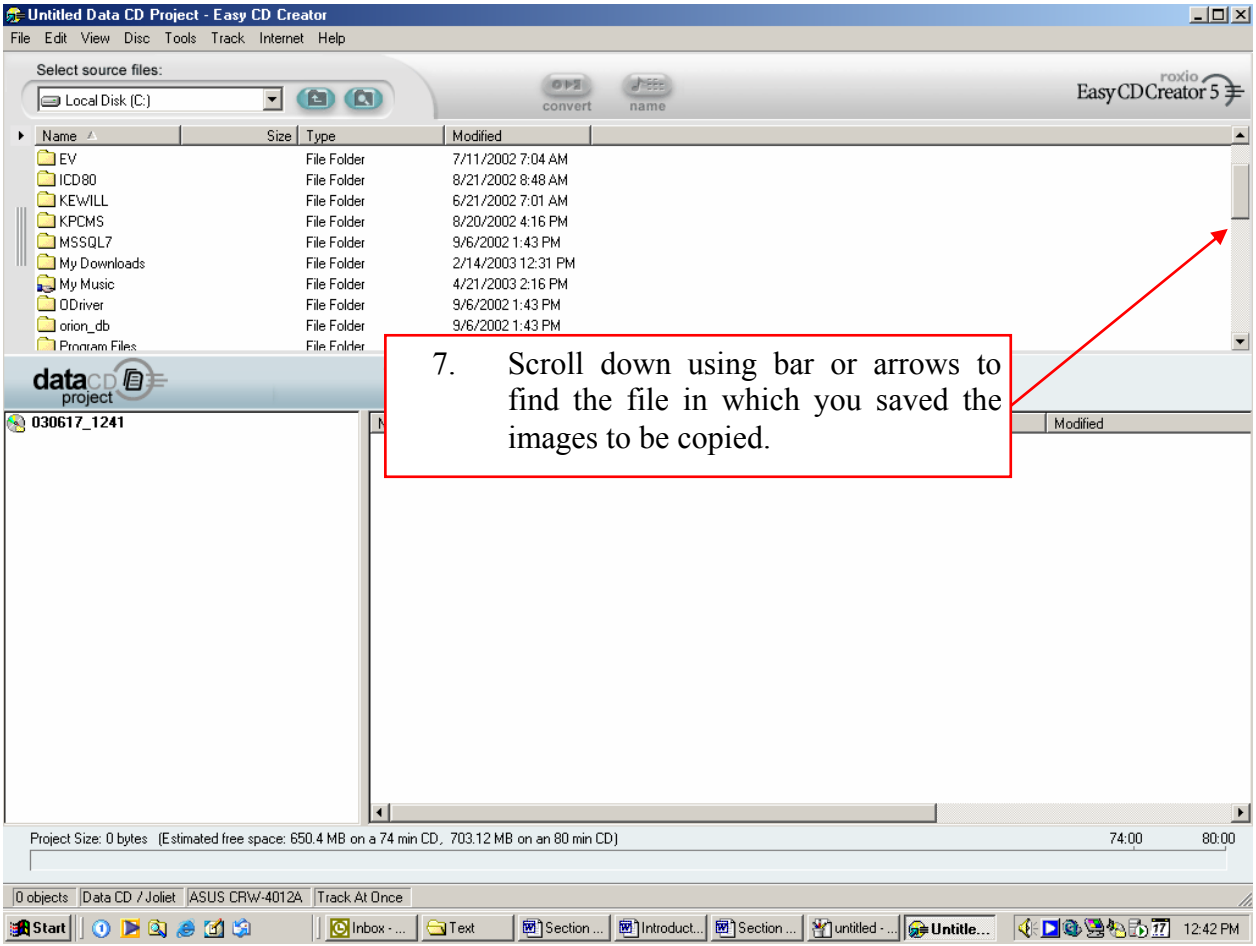

Easy CD Creator 5 basic
Select a Project
directCD
Format a directCD disc, so you can drag files to a CD using Windows Explorer.
make a music CD
make a data CD
dataCD project
Share or archive your computer files such as images, documents, spreadsheets, and presentations on CD in the most compatible format.
upgrade
web-checkup
make a photo or video CD
dataDVD project
Use your DVD recordable drive to store up to 4.7 GB of data.
CD label creator
disc copier
help
roxio

6 Click DataCD Project in the center of the screen.


dataCD project
Share or archive your computer files such as images, documents, spreadsheets, and presentations on CD in the most compatible format.

A screen will be displayed from which you can select files to be copied.


Untitled Data CD Project - Easy CD Creator
File Edit View Disc Tools Track Internet Help
Select source files:
Local Disk (C:)
convert
name
roxio Easy CD Creator 5
Name Size Type Modified
EV File Folder 7/11/2002 7:04 AM
ICD80 File Folder 8/21/2002 8:48 AM
KEWILL File Folder 6/21/2002 7:01 AM
KPCMS File Folder 8/20/2002 4:16 PM
MSSQL7 File Folder 9/6/2002 1:43 PM
My Downloads File Folder 2/14/2003 12:31 PM
My Music File Folder 4/21/2003 2:16 PM
ODriver File Folder 9/6/2002 1:43 PM
orion_db File Folder 9/6/2002 1:43 PM
Program Files File Folder
dataCD project
030617_1241
Modified
Project Size: 0 bytes (Estimated free space: 650.4 MB on a 74 min CD, 703.12 MB on an 80 min CD)
74:00
80:00
0 objects
Data CD / Joliet
ASUS CRW-4012A
Track At Once
Start
Inbox - ...
Text
Section ...
Introduct...
Section ...
untitled - ...
Untitle...
12:42 PM

7. Scroll down using bar or arrows to find the file in which you saved the images to be copied.

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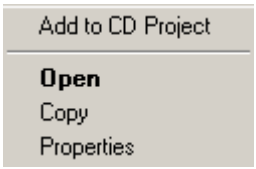
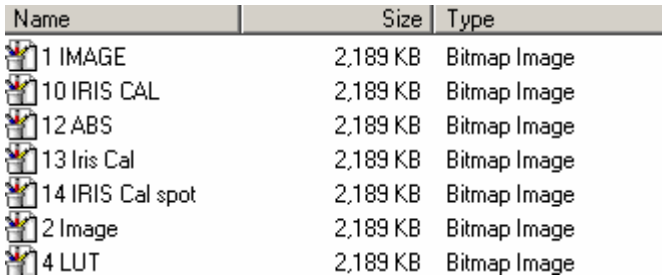
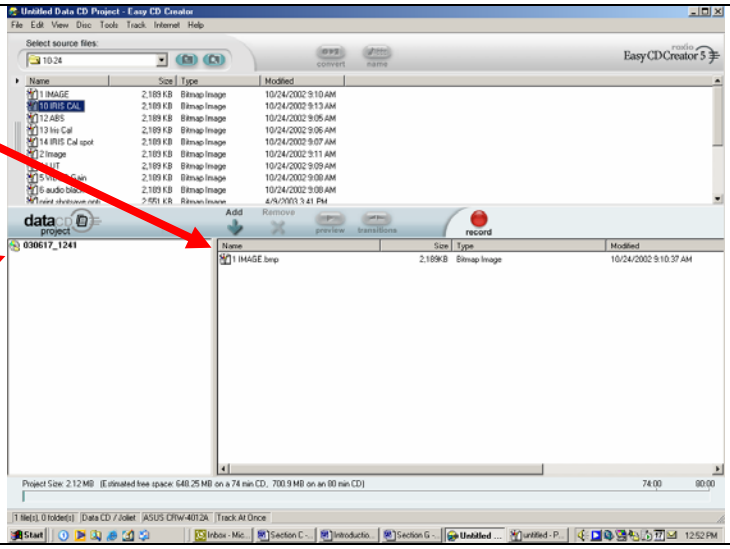
8 Position the cursor arrow over the first image that you want to copy and right click. A menu will be displayed.




Name
Size
Type
1 IMAGE 2,189 KB Bitmap Image
10 IRIS CAL 2,189 KB Bitmap Image
12 ABS 2,189 KB Bitmap Image
13 Iris Cal 2,189 KB Bitmap Image
14 IRIS Cal spot 2,189 KB Bitmap Image
2 Image 2,189 KB Bitmap Image
4 LUT 2,189 KB Bitmap Image

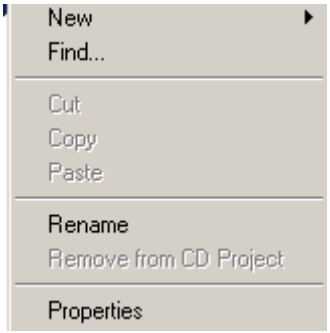
9 Click on Add to CD Project. The selected image will then appear in the window below the listing

To change the title of the CD, position the cursor over the default title box.



Right Click. A sub-menu will be displayed.

Select Rename and the default name becomes “live”. Type the name you wish to use over the existing name.



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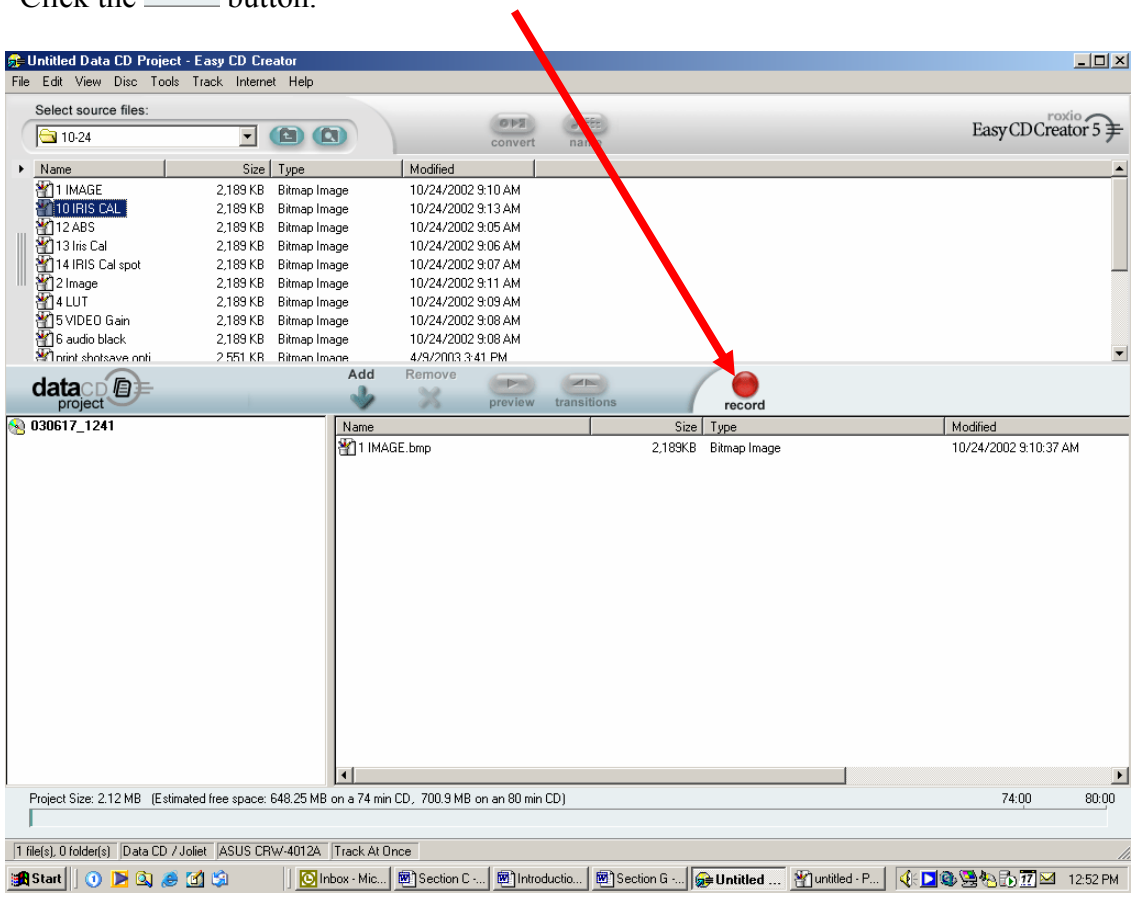
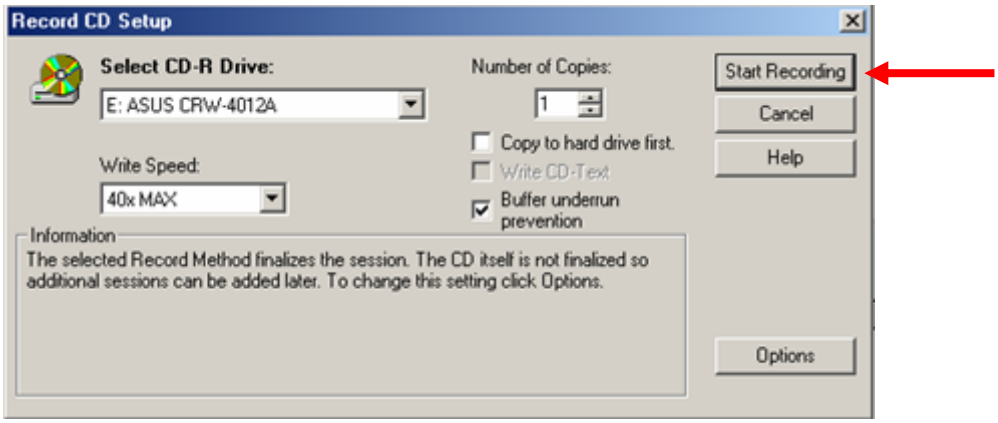
10 Once all of the files that you want to copy have been added to the list, you are ready to record. Click the record button.


Untitled Data CD Project - Easy CD Creator
File Edit View Disc Tools Track Internet Help
Select source files:
10-24
Easy CD Creator 5
Name Size Type Modified
1 IMAGE 2,189 KB Bitmap Image 10/24/2002 9:10 AM
10 IRIS CAL 2,189 KB Bitmap Image 10/24/2002 9:13 AM
12 ABS 2,189 KB Bitmap Image 10/24/2002 9:05 AM
13 Iris Cal 2,189 KB Bitmap Image 10/24/2002 9:06 AM
14 IRIS Cal spot 2,189 KB Bitmap Image 10/24/2002 9:07 AM
2 Image 2,189 KB Bitmap Image 10/24/2002 9:11 AM
4 LUT 2,189 KB Bitmap Image 10/24/2002 9:09 AM
5 VIDEO Gain 2,189 KB Bitmap Image 10/24/2002 9:08 AM
6 audio black 2,189 KB Bitmap Image 10/24/2002 9:08 AM
Add
Remove
preview
transitions
record
030617_1241
1 IMAGE.bmp 2,189KB Bitmap Image 10/24/2002 9:10:37 AM
Project Size: 2.12 MB (Estimated free space: 648.25 MB on a 74 min CD, 700.9 MB on an 80 min CD)
74:00
80:00
1 file(s), 0 folder(s)
Data CD / Joliet
ASUS CRW-4012A
Track At Once
Start
12:52 PM

11 The Record CD Setup screen will be displayed. Make appropriate selections and then click Start Recording.



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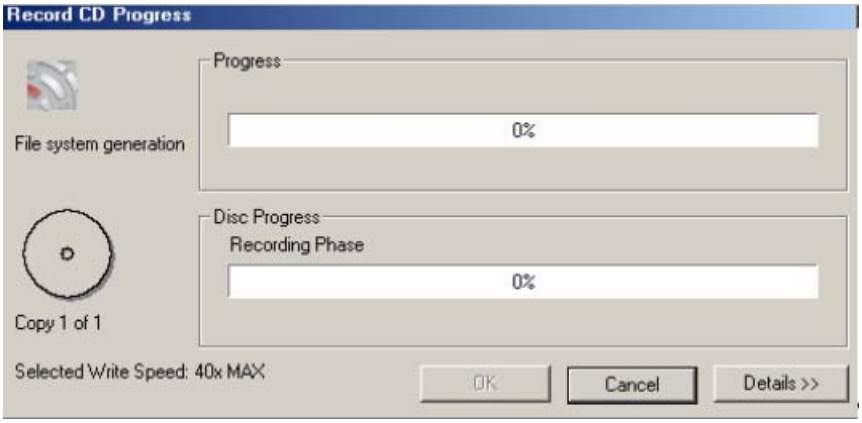
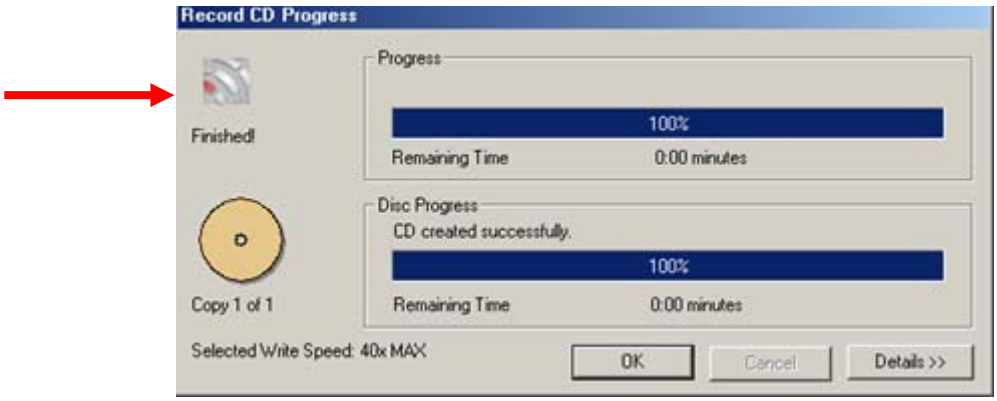
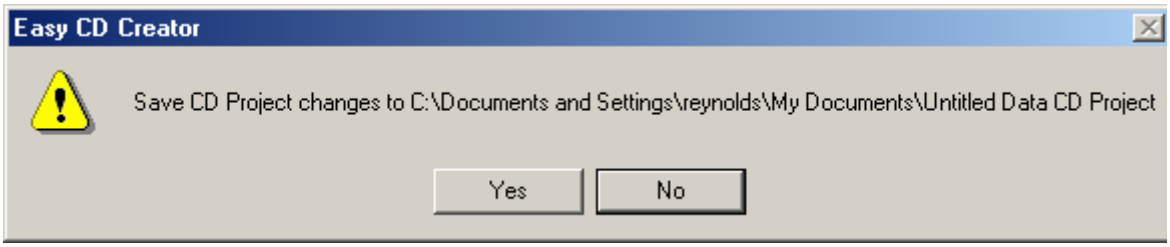
12 Your CD will begin to record. Do not touch any buttons during this process.



13 When the process is complete, the screen will read "Finished." Click OK to close the window.



14 You will then have an opportunity to save this project to a folder for future use. To save files, click Yes. Otherwise, click No to close the program.


Easy CD Creator
Save CD Project changes to C:\Documents and Settings\reynolds\My Documents\Untitled Data CD Project
Yes
No

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9.6. Creating DVDs (or CDs) with NERO® Essentials

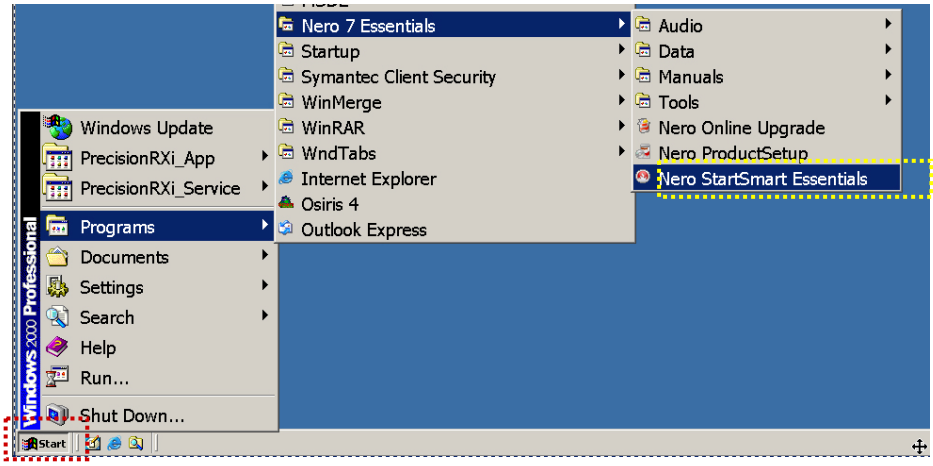
WARNING:
MAKE REFERNCE TO THIS SECTION ONLY IF YOU HAVE A DIGITAL PC WITH DVD WRITER DEVICE.

Follow these steps to burn CDs/DVDs using Nero® StartSmart Essentials:

1 Place a blank CD/DVD in the CD/DVD Recorder Tray.

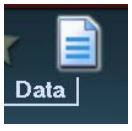
2 Click the Start button on your Desktop.

3 Select Programs / Nero 7 Essentials / Nero StartSmart Essentials.



4. Select a disc type: CD or DVD for burning at the top of the Nero® Menu.

5 Click on the Data icon on the Nero Menu.



6 Next, click on the Make Data Disc icon.

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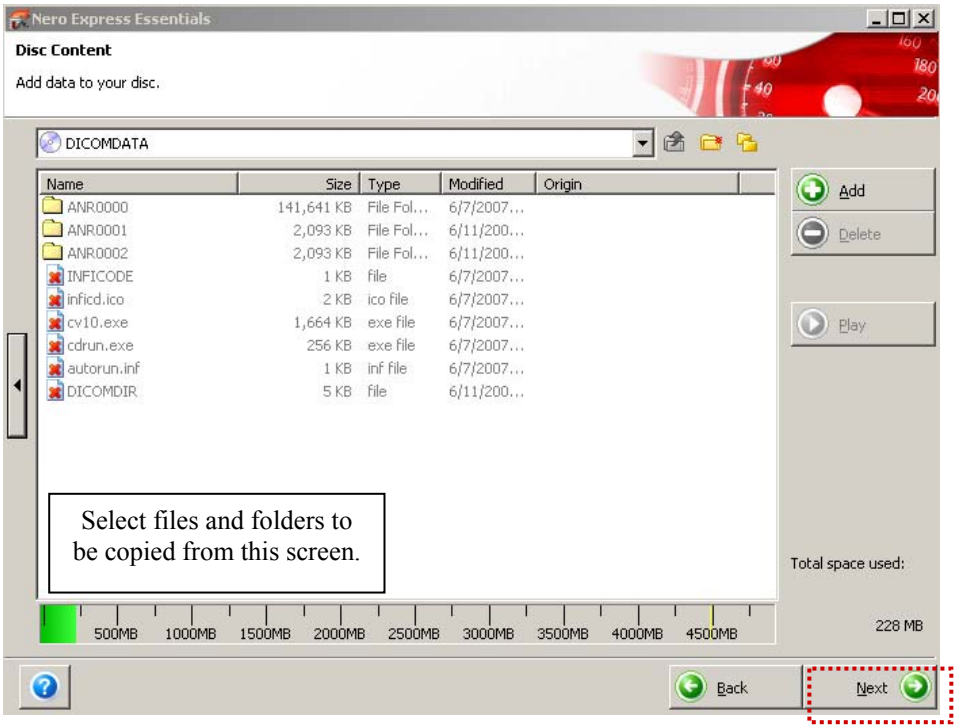
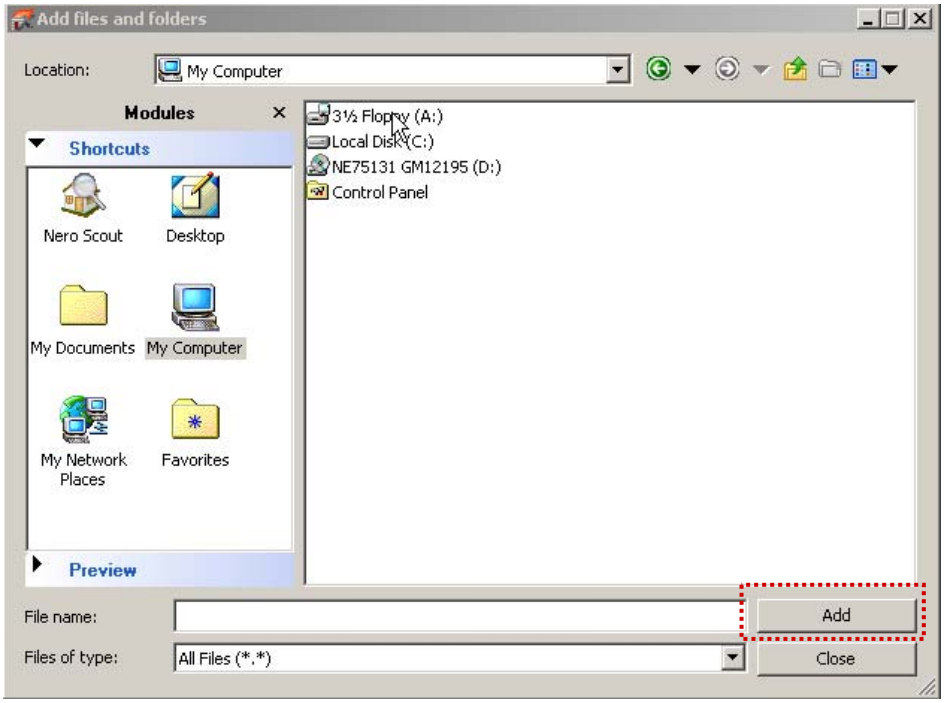
7. The Nero® Express Disc Content screen will display.



8. Click on the Add button. The Select files and Folders screen will display below the Nero Express window.

9 Browse to select the wanted files and folders to place on your disc.

10 Press the Add button on its screen This action will add the files into the window above this screen.



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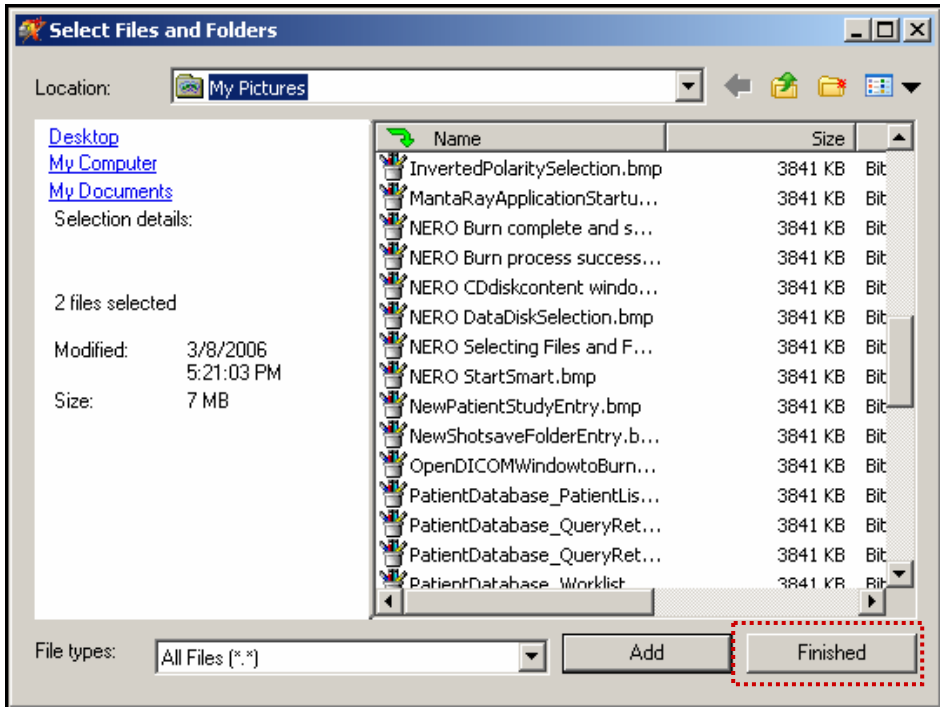
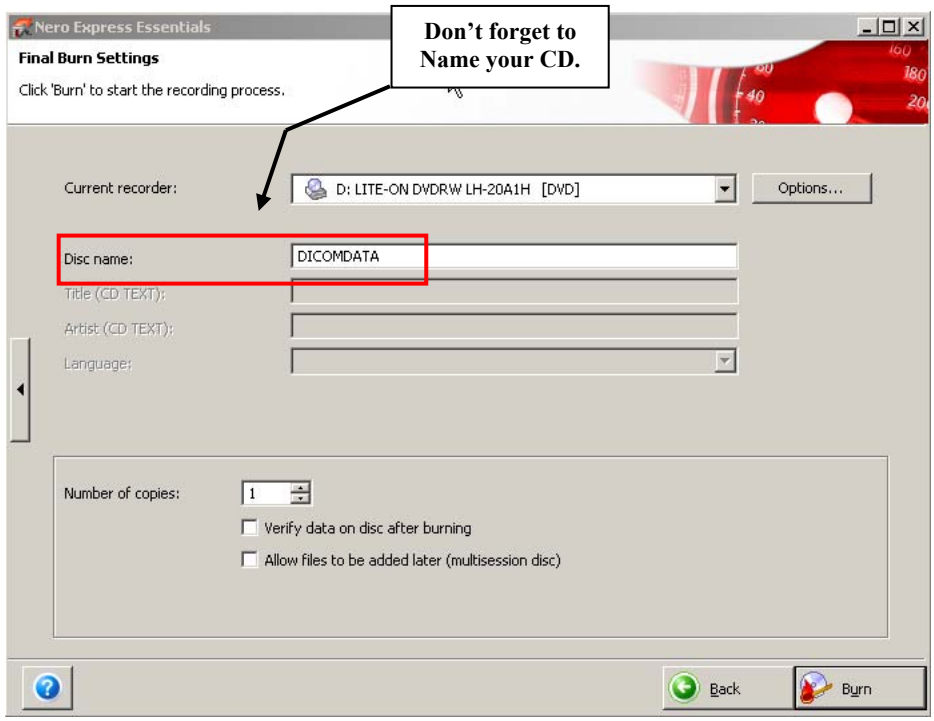
11 The files within the selected folder will display in this window. You can select all or specific files within this list by single clicking on each item while holding down the Ctrl (Control) key.



12 When you are finished selecting files, press the Finished button.

This will display the window with all selected files.

13 Next, name your disc and you are ready to burn your disc; Press the Burn button start the burn process.



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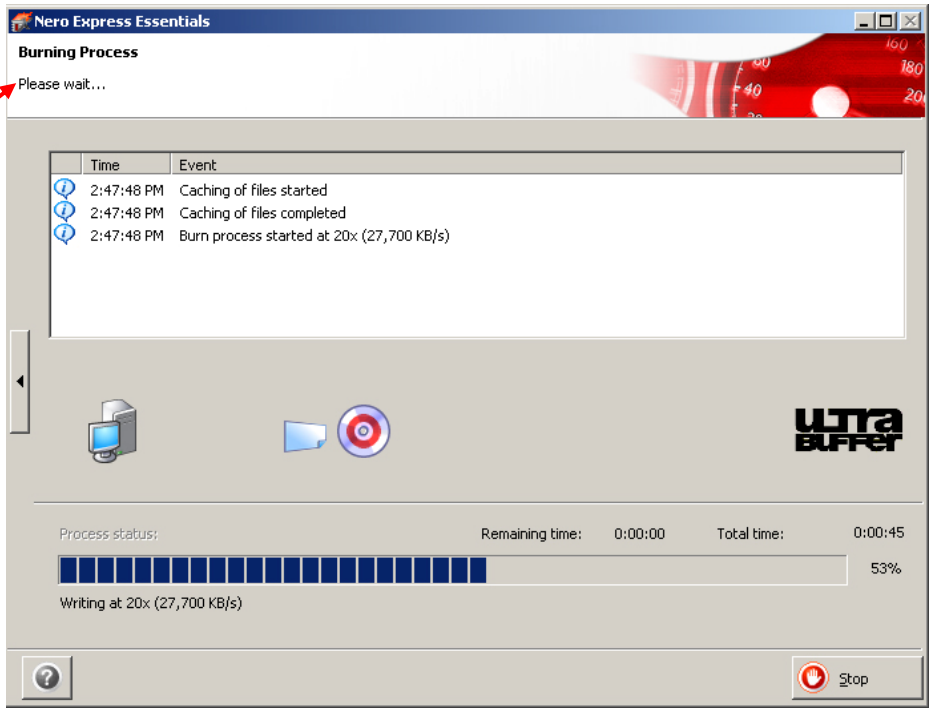
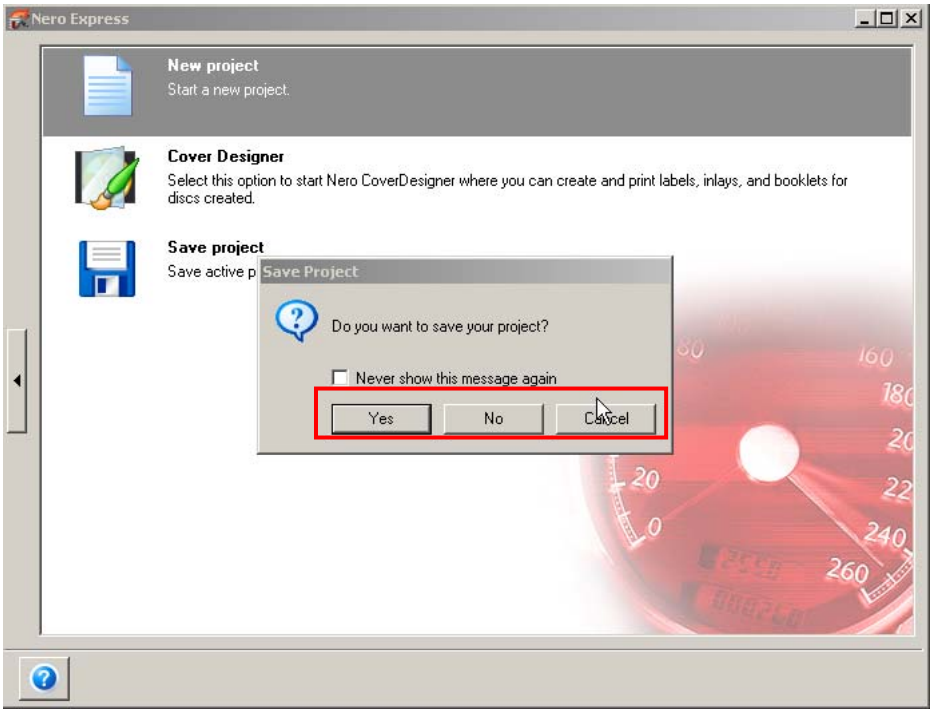
14 Wait to see the "Successful" indicator at the top of the screen. There are several indicators on the screen display about the burning progress of the of the disc.



15 The time remaining indicator and the percentage readout for the burning progress.

16 When the burn has completed and reads at 100%.

17 Finally, the display screen will change and a Pop-up window ill prompt you for an answer to Save this collection of files as a project. If so, click Yes. You will be prompted with a Save Project window to Save it to a location of your choice.


Nero Express
New project
Start a new project.
Cover Designer
Select this option to start Nero CoverDesigner where you can create and print labels, inlays, and booklets for discs created.
Save project
Save active p
Save Project
Do you want to save your project?
Never show this message again
Yes
No
Cancel

18 Indicate your choice by clicking the appropriate button. Selecting No or Cancel will eject the CD/DVD tray and this process is complete.

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9.6.1. Saving Project

If you clicked Yes indicating that the project is to be saved, the Save As window will display. Select the location that you want to use to store the file, name the file, and then click Save.

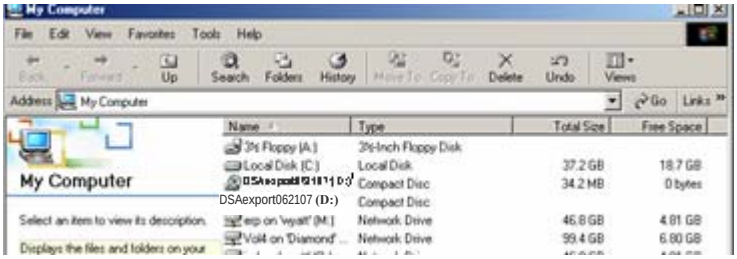
9.6.2. Viewing the CD / DVD

Once the CD/DVD has been created, remove it from the CD/DVD Recorder tray and place into the CD/DVD Player tray. It is a good idea to check to make sure all the files were successfully recorded.

Double click on the CD/DVD icon that has the recently burned CD/DVD:

1 Double click on the My Computer icon on your Desktop.
2 The files and folders on your computer are displayed.

The CD/DVD should contain all of the files that were selected for copying into the CD/DVD Project Window.


My Computer
File Edit View Favorites Tools Help
Back Forward Up Search Folders History Move To Copy To Delete Undo Views
Address My Computer
Go Links
My Computer
Select an item to view its description.
Displays the files and folders on your
Name Type Total Size Free Space
3½ Floppy (A:) 3½-Inch Floppy Disk
Local Disk (C:) Local Disk 37.2 GB 18.7 GB
Compact Disc 34.2 MB 0 bytes
DSAexport062107 (D:) Compact Disc
Network Drive 46.8 GB 4.81 GB
Network Drive 99.4 GB 6.80 GB

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10. Measurement Functions

The *Precision RXi* offers a selection of measurement tools that can be applied to an image and used for reference. Please note that these measurements are approximate and should be used for reference estimate only. Also, in order to get the most accurate measurements, calibration must be done prior to the application of a measurement.

CAUTION: *Do not drag the measurement tool bar into the main image area when setting up any measurement function.*

In order to access this feature, a patient file must be open for review. These are the available *Measurement Tools.*

To access:

1 Click on in cursor tool bar.
2 The Measurement tool bar will be displayed.

Left click to display Measurement Tool Bar

Each button will activate a specific measurement tool.
Refer to individual sections for details on using each tool.

Length, Distance, Angular and Calibration functions can be done simultaneously.
ses

WARNING: *The eraser button can be used at any time the Measurement Tool Bar is active and there are measurements on the screen but it will cause all measurements indicated on the screen to be deleted.*

Key to Measurement Tool Buttons			
	Calibrate		Photo-file icon
	Length Measurement		Eraser
	Distance Measurement		Exit Measurement Function
	Angular Measurement		

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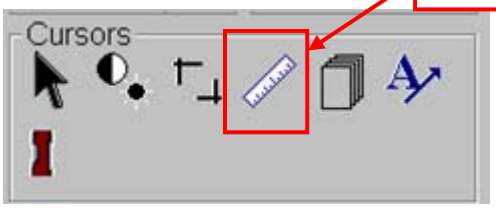
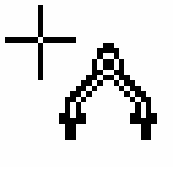
10.1. Calibration

Prior to using Length and/or distance measure, use this button to calibrate against a standard catheter length or other known marker.

NOTES: Calibration must be performed for each sequence on which a measurement is to be performed. The calibration persists only as long as the sequence is active. Reference Step 1 of this section for complete calibration instructions.

10.1.1. Set up Calibration

From Interface.	
	To access, click on in the *Cursor Tool Bar.* The Measurement Tool Bar will display.
 Calibration Button	 Chursor change

1 Click on the Calibration button.

2 The cursor will change to a compass when over the image area.

3 Left-click and release the mouse at the point at which the Measurement is to be started, then move the Cursor.

4 A line will be "stretched" across the screen to indicate distance covered.

5 Left-click when the Cursor is positioned at the point at which the Measurement is to end.

6 A line will be drawn and the Calibrate dialog box will display.

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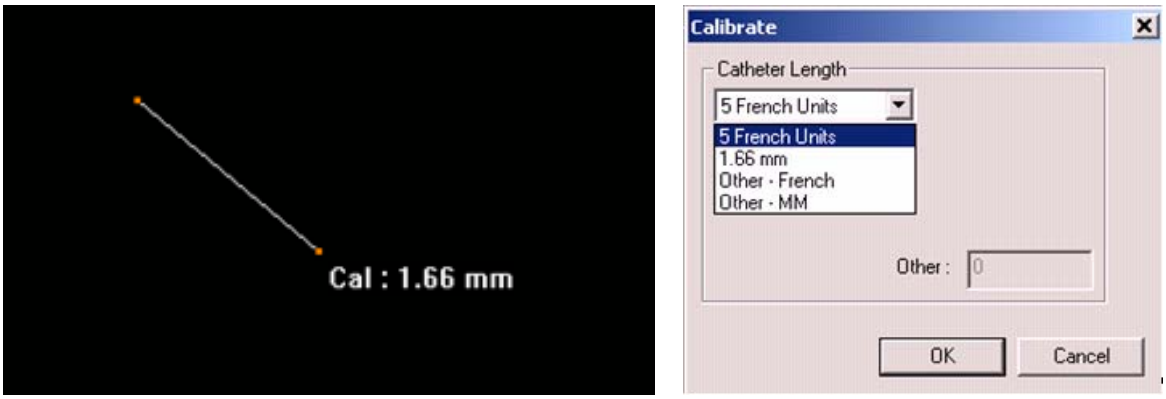
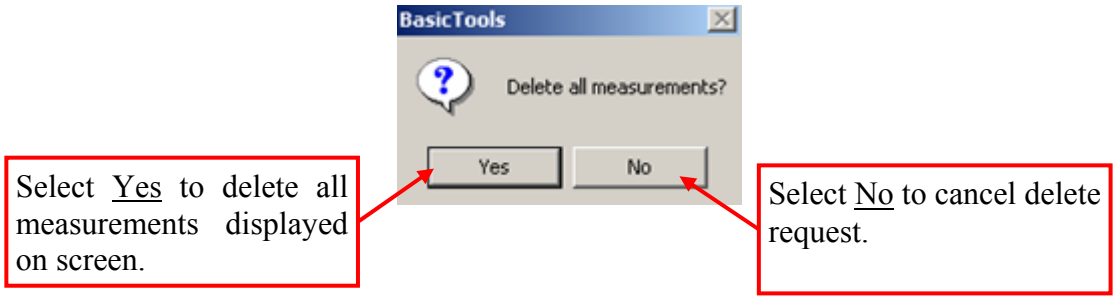


1.66 mm Calibration Measurement;
Line Created Using Calibration Button

7 Choose the catheter size by selecting from the Drop-down menu, and then click the OK button.

8 The length of the line will display with the correct Calibration units.

9 To Delete the line completely use the Eraser .
A Basic Tools Confirmation dialog box will display.



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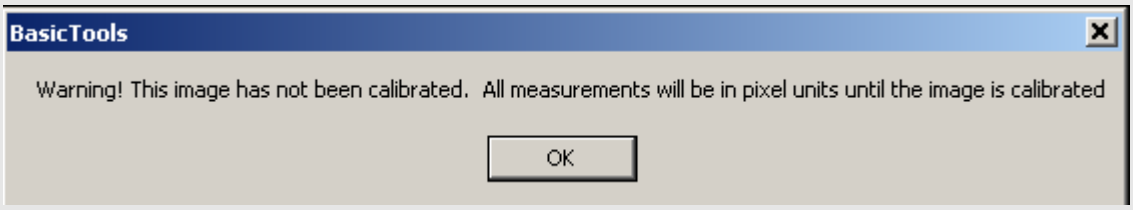
10.2. Length Measure

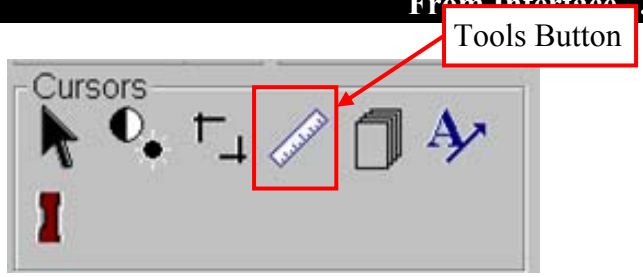
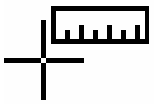
Use Length Measure to perform a quick length measurement on an image. The length measurement is temporary. Use the photofile function to create a new image that will include measurements. Reference discussion of Photofile (10.5 in this section). There is no means other than *Photofile* to record the measurement for later review.
If more than one length needs to be measured, use the distance measure function (see part. .3 Distance Measure)

NOTE: *The tool must be calibrated for each sequence on which a measurement is to be performed, and the calibration persists only as long as the sequence is active. If calibration has not been done, the following message will be displayed when a measurement is attempted.*


BasicTools
Warning! This image has not been calibrated. All measurements will be in pixel units until the image is calibrated
OK

Reference Step 1 of this section for complete calibration instructions.

10.2.1. Set-up Length Measure

From Interface...	
	To access, click on in the *Cursor Tool Bar.* The Measurement Tool Bar will display.
 Measurement button	 Cursor Change

1 Calibrate the image (follow instructions in Part 10.1 – Calibration) and then click on the Length Measure button.

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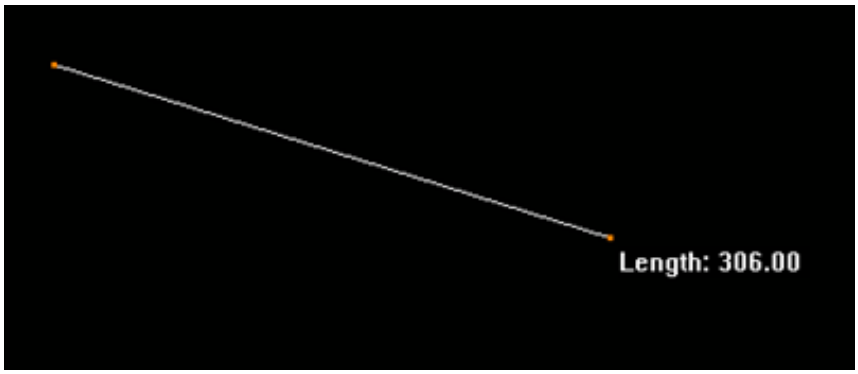
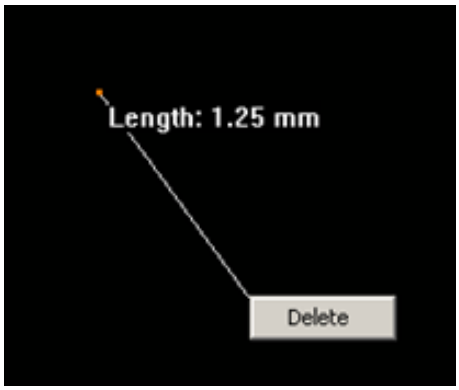
2 The Cursor will change to a small ruler when over the image area.
3 Left-click and release the Mouse at the point at which the Measurement is to be started. Then move the Cursor. A line will be "stretched" across the screen to indicate distance covered.
4 Left-click the Mouse when the Cursor is over the point where the Measurement is to end.
5 A line will be drawn and text will indicate the length of the line in the correct units and that the correct Calibration setting is used.



Line Created Using Length Measure Button

10.2.2. Delete Measurement

To delete an individual measurement setting (not all measurements):
1 Right-click on either of the end points (dots) on the line.
2 The Delete button will be displayed



3 Left click the Delete button. The measurement will be deleted.

NOTE:
Measurements outside shutter locations are not printed on designated hard copy or displayed on the main image monitor after photofile.

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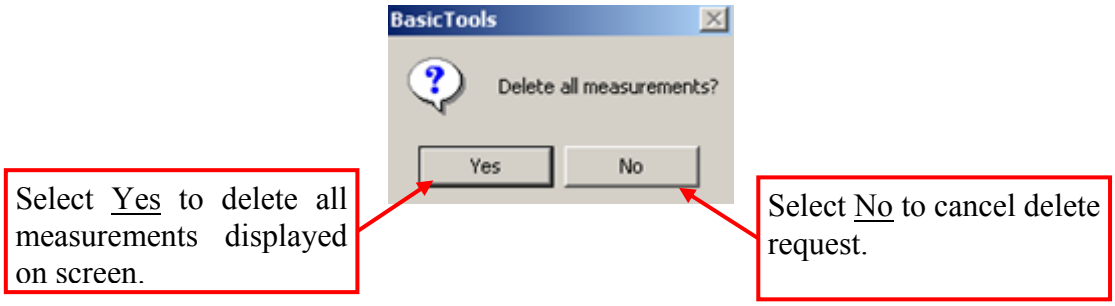
10.2.3. Delete All Measurements

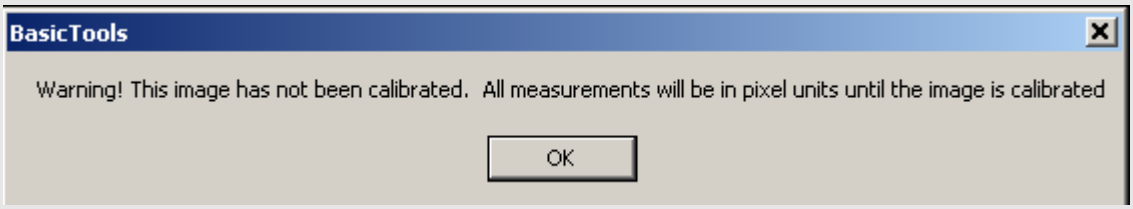
To delete the all measurements on the screen, use the *Eraser* button ( ). A *Basic Tools* confirmation dialog box will be displayed



10.3. Distance Measure

Use Distance Measure to quickly perform a quick multi-segment distance measurement on an image. The tool must be calibrated for each sequence on which a measurement is performed, and the calibration persists only as the sequence is active.
The length measurement is temporary. Use the photofile function to create a new image that will include measurements. Reference discussion of Photofile (10.5 in this section).

NOTE:
The tool must be calibrated for each sequence on which a measurement is to be performed, and the calibration persists only as long as the sequence is active. If calibration has not been done, the following message will be displayed when a measurement is attempted.


BasicTools
Warning! This image has not been calibrated. All measurements will be in pixel units until the image is calibrated
OK

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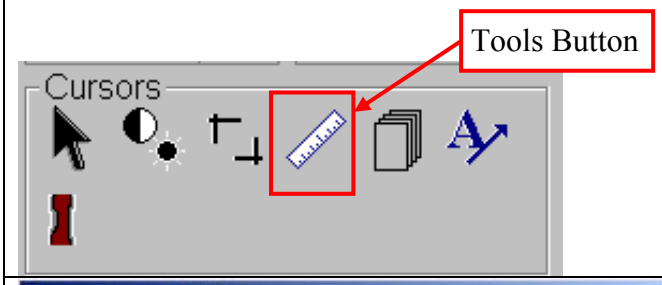
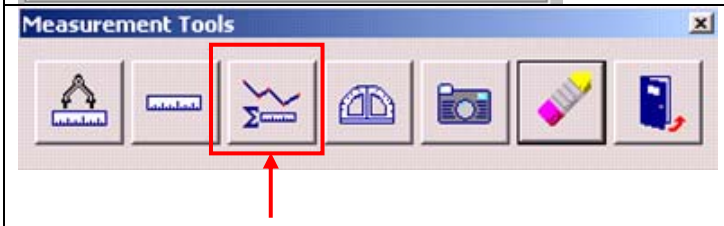
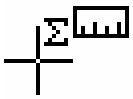
10.3.1. Set-up Distance Measure

From Interface…	
	To access, click on in the *Cursor Tool Bar.* The Measurement Tool Bar will display.
 Distance Measurement Button	 Cursor Change

1 Calibrate the image (follow instructions in part #1 – Calibration) and then click on the Length Measure button.

2 The cursor will change to a small ruler when over the image area.

3 Left-click and release the mouse at the point at which the measurement is to be started and then move the cursor. A line will be "stretched" across the screen to indicate distance covered.

4 Left click the mouse when at a break point in the measurement.

5 Repeat Step 3 and 4, moving the mouse to the next break point and left click.

NOTE:
You can add as many break points in the measurement as necessary

6 Double-click to end the distance measure and final measurement. Reference Figure below for a sample distance measurement.

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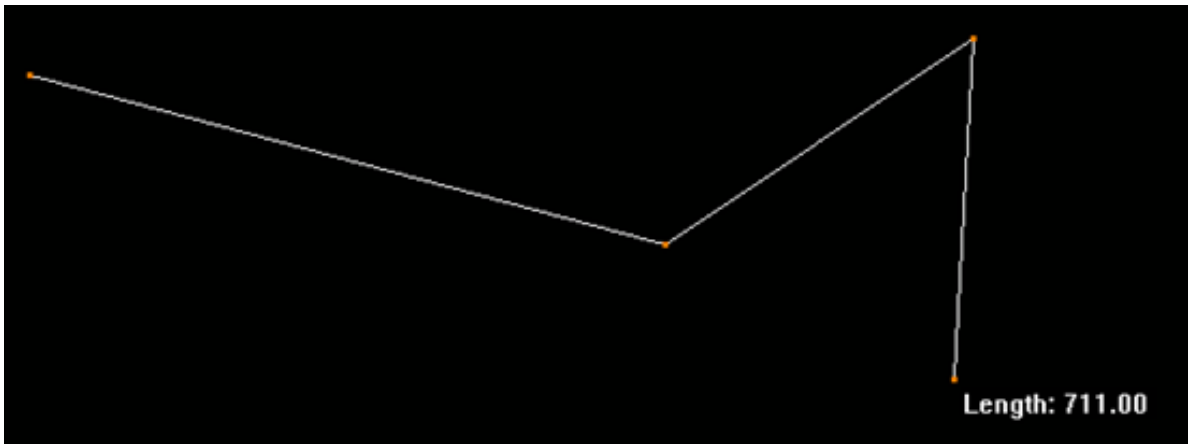


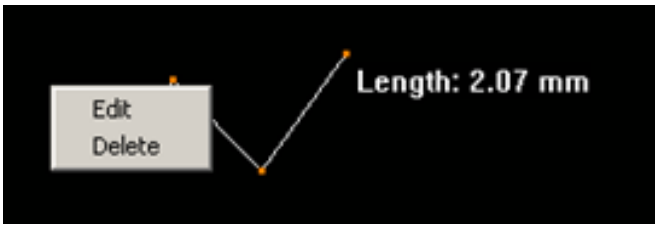
Line Created Using Distance Measure Button

NOTE:
Measurements outside shutter locations are not printed on designated hard copy or displayed on the main image monitor after photofile

10.3.2. Edit Measurement

To edit a line on the distance measurement:

1 Right-click on any of the end points (dots) on the line.
2 The Edit/Delete button will be displayed.



3 Click on the Edit button.
4 The line will become “live” and can be reset as required.

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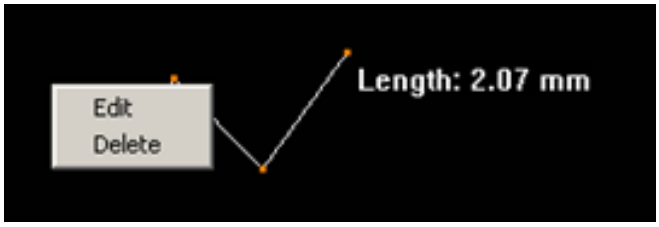
10.3.3. Delete Measurement

To delete an individual measurement setting (not all measurements):

1 Right-click on either of the end points (dots) on the line.
2 The Edit/Delete button will be displayed.



3 Left-click the Delete button.
4 The measurement will be deleted.

10.3.4. Delete All Measurements

To delete the line completely, use the eraser ( ). A confirmation dialog box will be displayed

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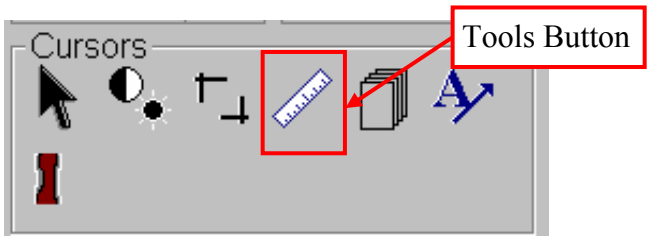
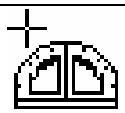
10.4. Angular Measure

Use *Angular Measure* to perform a quick *Angular Measurement* on an image.

The angular measurement is temporary.
There is no means other than *Photofile* to record the *Measurement* for later review.

10.4.1. Set up Angular Measure

From Interface…	
	To access, click on in the *Cursor Tool Bar.* The Measurement Tool Bar will display.
 Angular Measure Button	 Cursor Change

1 Click on the Angular Measure button.

2 The Cursor will change to a small protractor symbol
3 Left-click on the first end-point of the angle to be measured.
4 A dot is placed at the point where the Mouse was clicked.
5 Left-click on the second end-point of the angle to be measured.
6 A dot is placed at the point where the Mouse was clicked and a line is drawn connecting the two dots.
7 Move the Mouse to the vertex of the angle and left click.
8 The angle will be drawn and the size of the angle displayed.

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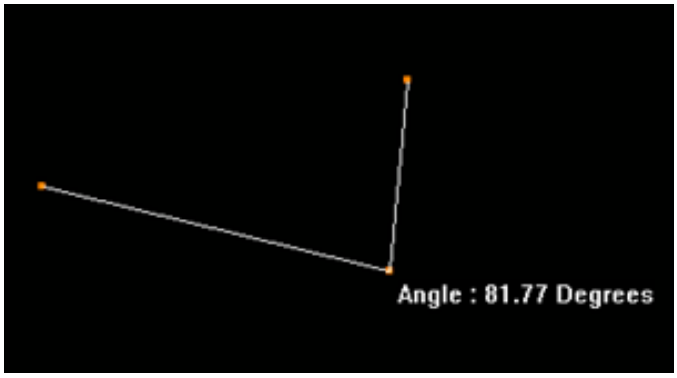


Line Created Using Angular Measure Button

10.4.2. Moving Angle Measurement

To move the text indicating the angle measurement:

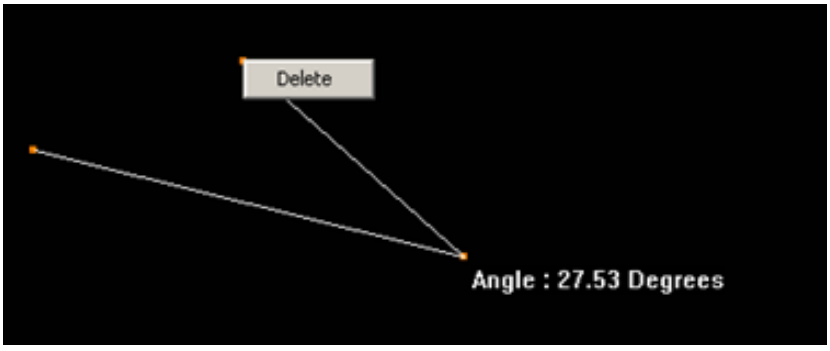
1 Position the cursor over any portion of the text.
2 While holding down the left mouse button, move the text to the desired location on the screen. While the text is being moved, the angle will be highlighted.
3 When the text is properly positioned, release the left mouse button. The angle will no longer be highlighted.

NOTE:
Measurements outside Shutter locations are not printed on designated hard copy.

10.4.3. Delete Angular Measurement

To delete an individual angular measurement setting (not all measurements):

1 Right-click on either of the end points (dots) on the line.
2 The Delete button will be displayed.



3 Left click the Delete button. The measurement will be deleted.

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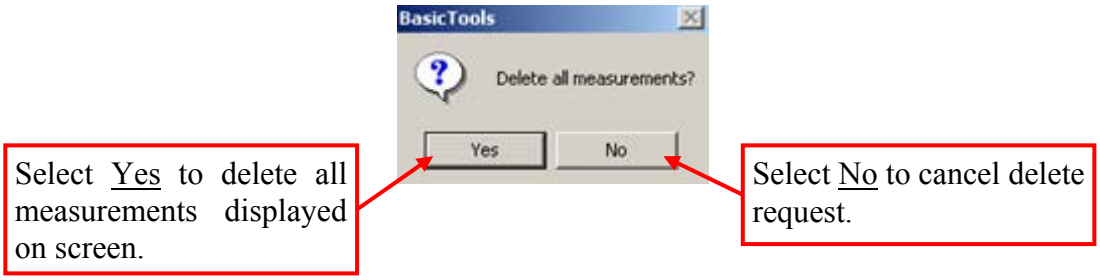
10.4.4. Delete All Measurements

To delete the line completely, use the eraser ( ). A confirmation dialog box will be displayed



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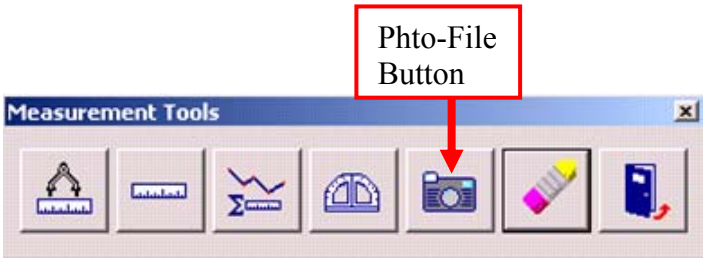
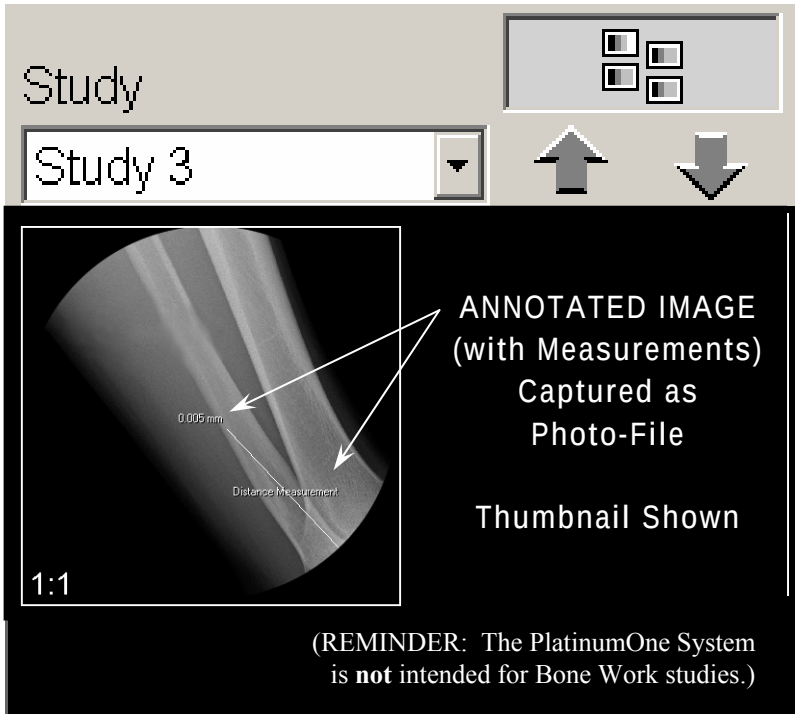
10.5. Save Annotated Image as Photo-File

This feature allows for annotated images to be captured and added to patient for future review, printing or export. Essentially, a snapshot is made of the annotated image, which then will appear as part of the thumbnail screen.
All markings are transferred and permanently saved with the image.

NOTE:
This is the only way to save the Measurements and Lines drawn on an image.



1 After entering all measurements, but before exiting measurement mode, click on the Photo-File button.
2 A "snapshot" is made of the image that includes all measurements and markings.
3 The image is saved to the Thumbnail display for future review, printing or export.



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10.6. Exit Measurement Tools

Click the *Door* button to exit from the *Measurement* tool function.

All measurements will be deleted and the *Measurement* tool bar will disappear.

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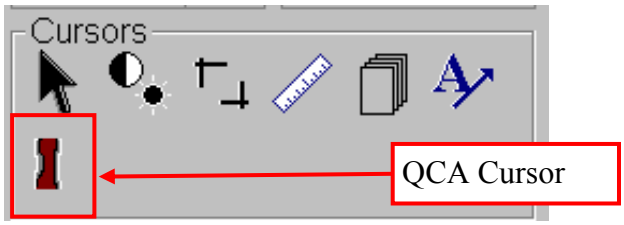
10.7. QCA Processing

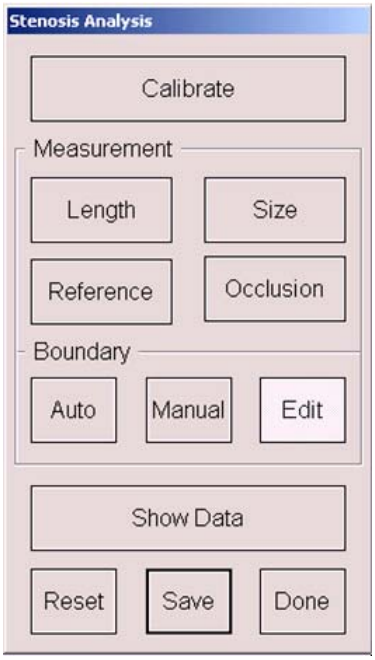
Precision RXi offers a software feature that allows for the *Measurement* of the size of the vessel in order to determine the width and length of the stenosis.
Using the catheter as a *Calibration* reference, an accurate *Measurement* can be made of the size of the vessel in order to determine the size of the balloon or stent to be used.
To *Enable QCA* button, a *Confirmation dialog* box will display if *Acquisition* button is *Enabled.*

To Access QCA Processing…

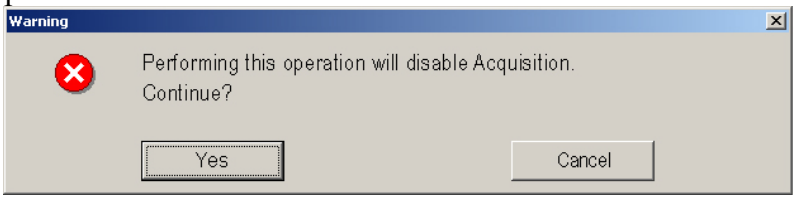


To access, click on the QCA icon in the Cursor Tool Bar.

The QCA Dialog box (Stenosis Analysis) will display.



Upon selecting the QCA button, a Warning displays to notify user that Acquisition will Disable during the QCA operation.



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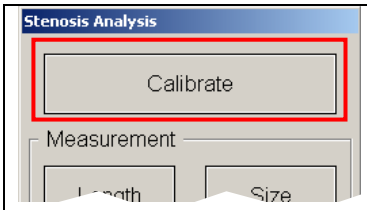
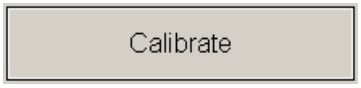
10.7.1. Stenosis Analysis Control Box Functions (QCA Dialog)





Calibrating the system involves the definition of the *Outer Boundaries* of a known diameter. It is important that the *Calibration* be performed accurately, since this procedure allows the system to assign a millimeter value to the "width" of each pixel of the image. This allows for accurate measurements.

1 From the top of the QCA dialog, select the Calibrate button.
When the user selects the "Calibrate" button, a 320x320 ROI 2X zoom window will be drawn in the center of the image and the cursor will be moved to the center of the image.
The user can "pan" the ROI by moving the Pointer Device around the image. To select the ROI, the user must press the left button on the Pointer Device. This will be used for Calibration.

The Calibration mode can be cancelled by pressing the right button.

2 Use the Pointer Device to position the Cursor near either side edge of the item to be used to calibrate the system.
3 Click and hold the left button on the Pointer Device.
4 Drag the Cursor across the width of the item. As the Cursor is moved, a line is shown on the screen.
5 Release the Pointer Device button when the line shown on the screen spans the width of the item (it can also go beyond the edge of the item).

The screen will change as follows:

- The Edge Detection Profile - Calibrate menu will appear over the image.
- The portion of the line drawn in step 4 that covers the item (as detected by the system) will become shaded.
- The default Calibration Value will appear on the image. This value will be updated once the actual value for the item's size is set.

If necessary, the *Edge Detection Profile* window can be selected and moved so that it does not cover the portion of the image of interest.

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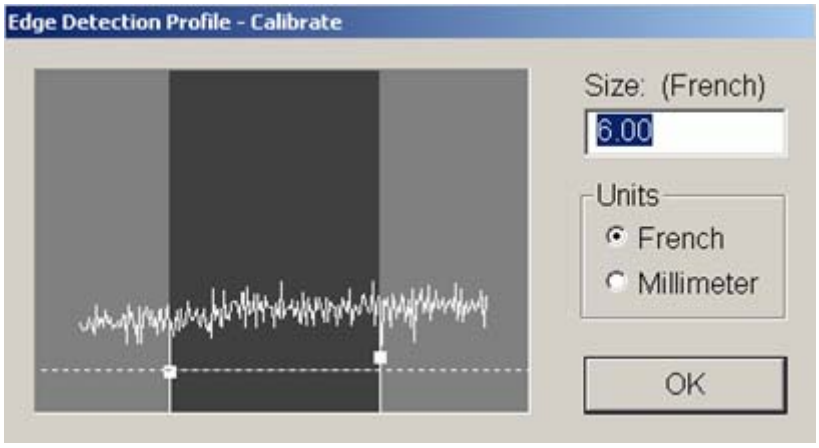
Calibrate

(Continued)



Edge Detection Profile - Calibrate

Adjusting Edge Points

- The darker shaded area of this screen represents the width of the item as detected by the system.
- The Size field defaults to French mode, size 6.00 (= 2.00 mm).
- The two vertical lines represent the Edge Points of the item as detected by the system.
- The graphical line represents the pixel Brightness Values for each point along the line as drawn in step 4 above.

To adjust the *Edge Points* for the *Calibration* item:

1 Select and drag either of the small square boxes found on the vertical lines in the graph until they represent the Preferred Edges of the Calibration item.
2 Select the desired Calibration mode: either French or Millimeters.
3 Change the Numerical Value for the item's size by highlighting the Size field and typing in the correct number. The defaults are French mode, size 6.
4 Select the OK button to accept the entries as they appear in the menu.

To maintain *Measurement* accuracy, *Calibration* should always be performed on the **frame** that *Measurements* are being done. Once a new frame is selected, the Calibration is reset and must be performed again.

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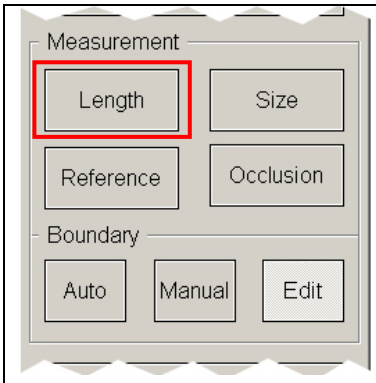

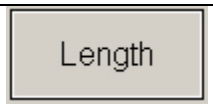

1 In the Measurement section of the QCA dialog, click on Length button.
2 The Cursor becomes a Cross-hair (+).
3 Position the Cursor at the starting point along the Centerline of the vessel.
4 Click and hold the left button on the Pointing Device.
5 Drag the Cursor along the path of the Centerline Area of the vessel.
6 When the Cursor is at the last desired point, release, and then double click the left Mouse button.
7 The system will automatically calculate a Vessel Boundary starting at approximately the First Control Point and ending approximately at the Last Control Point.
8 Double-click the left Mouse button to check that all the desired points are entered.
9 Then the Value will display on the screen next to the line.

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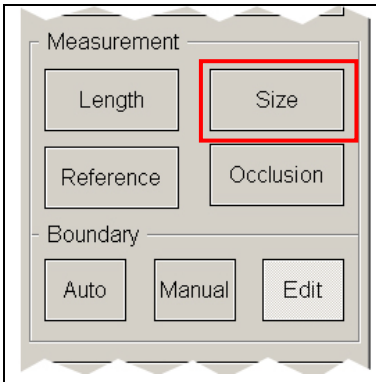


Size

This function allows the Measurement of the width of any place along the vessel, or a length of balloon needed for a particular lesion.

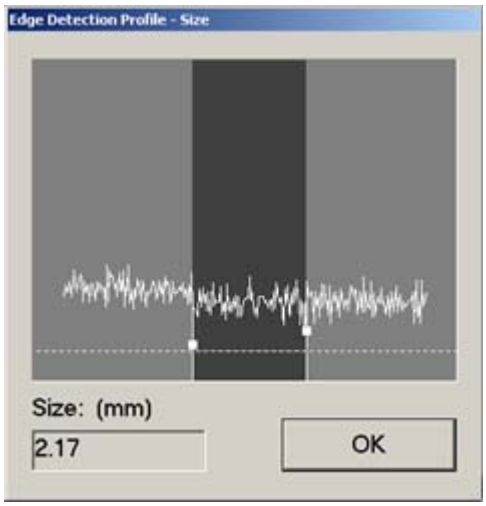
1 In the Measurement section of the QCA dialog, select the Size button from the menu portion of the screen.

2 Use the Pointing Device to position the Cursor at the edge of the vessel area to be measured.

3 Click and hold the left button on the Pointing Device.

4 Drag the cursor to the other side of the vessel (the line beyond the vessel edge can be extended). As the cursor is moved, a line is shown on the screen.

5 Release the Pointing Device button when the line shown on the screen spans the width of the vessel. The Edge Detection Profile - Size menu will appear over the image.



6 The size of the vessel, based on the Calibration performed earlier, is given on the image and in the Menu window.
If necessary, the Boundaries of the vessel can be changed by selecting either of the small squares on the vertical lines shown in the graph.
These lines represent the End Points for the vessel area based on the line drawn in step 4.

7 Select the OK button to close this window.
The Measurement Value and line will remain on the screen.

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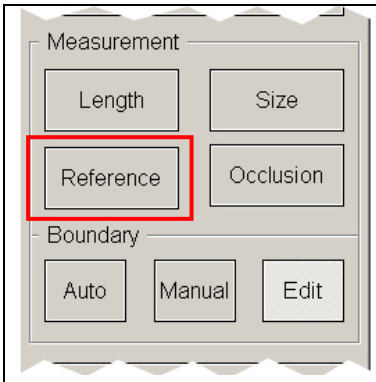
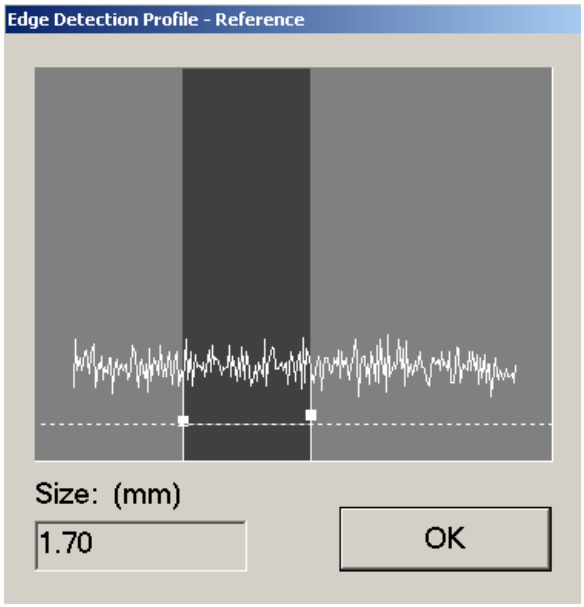


This option allows the size of a normal part of the vessel to be quickly established. This value will be used as a reference for a normal vessel size when calculating percent *Stenosis Values*.

1 In the Measurement section of the QCA dialog, select the Reference button.
2 Position the Cursor at the edge of the Vessel section to be used as a Reference Measurement.
3 Click and hold the left button on the Pointing Device.
4 Drag the Cursor to the other edge of the vessel. As the Cursor is moved, a line is shown on the screen.
5 Release the Pointing Device button when the line shown on the screen accurately spans the width of the vessel. The Edge Detection Profile - Reference menu will appear over the image.



6 The size of the vessel, based on the Calibration performed earlier, is given both on the image and in the Reference window. If necessary, the Boundaries of the item can be changed by selecting either of the small squares on the vertical lines shown in the graph. These lines represent the End Points for the vessel as drawn in step 4.
7 Select the OK button to close this window. The Measurement Value and line will remain on the screen.

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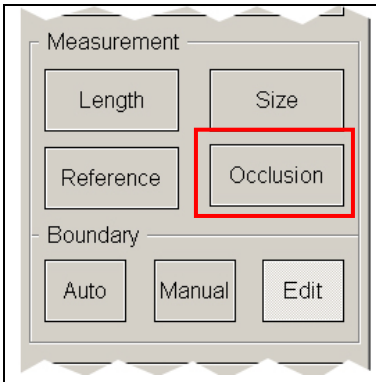
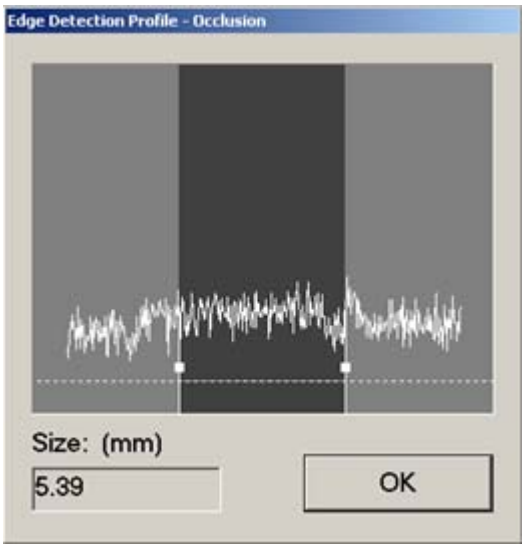


Occlusion

This option allows the size of a normal part of the vessel to be quickly established. This value will be used as a reference for a normal vessel size when calculating percent *Stenosis Values.*

1 In the Measurement section of the QCA dialog, select the Reference button.
2 Position the Cursor at the edge of the vessel section to be used as a reference Measurement.
3 Click and hold the left button on the Pointing Device.
4 Drag the cursor to the other edge of the vessel. As the Cursor is moved, a line is shown on the screen.
5 Release the Pointing Device button when the line shown on the screen accurately spans the width of the vessel. The Edge Detection Profile - Reference menu will appear over the image.



6 The size of the vessel, based on the Calibration performed earlier, is given both on the image and in the Reference window. If necessary, the Boundaries of the item can be changed by selecting either of the small squares on the vertical lines shown in the graph. These lines represent the end points for the vessel as drawn in Step 4.
7 Select the OK button to close this window. The Measurement Value and line will remain on the screen.

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Boundary – Auto

- If there is already a Vessel Boundary present, it will be cleared from the display.
- The Cursor will be changed to a Cross-hair indicating the system is ready.

There are two different ways of entering centerline points:

Draw Line:

Position the *Cursor* at the starting point along the centerline of the vessel, and click-and-hold the left button on the *Mouse* (or other *Pointing Device*).

Then move the *Cursor* along the path of the centerline area of the vessel.

When the *Cursor* is at the last desired point, release, and then double-click the left *Mouse* button in the image area. The system will then **automatically calculate a Vessel Boundary** starting at approximately the *First Control Point* and ending at the approximately the *Last Control Point*.

Boundary - AUTO:

1. In the Boundary area of the QCA dialog, click on the Auto button once to Enable.
2. Then, move Cursor to image area.
3. Trace one edge of the vessel to be measured from point A to point B and release the mouse button.
4. Click again on Auto button and the system will automatically complete the trace of the vessel and the Measurements will appear in the image area.

Position Points:

Position the *Cursor* in the *Starting Point*, and click the left button on the mouse. This will set the *Starting Point* for the *Centerline Measurement.*

Then, move the *Cursor* to the next desired point along the *Centerline* of vessel, and click the *Mouse* button again A line will appear connecting each point, as it is set.

Any number of points can be entered (minimum = two). Double-click the left *Mouse* button to set the last point.

The system will automatically identify the edges of the vessel and calculate the *Occlusion Information.*

NOTE:
Clicking the right Mouse button will erase the last entered point.

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Boundary - Manual

For either type of entry, once done, the *Vessel Profile* (detected edges) will be drawn on the screen. The system will then automatically display the *Stenosis Measurement Results* window.

To manually adjust the vessel limits and the Stenosis position in the same manner as with the old version of the feature (select *Edit Boundary* button, then point and drag a point to the desired location).

The *Manual* option allows the edges of the entire vessel lesion area of interest to be traced. The system then uses these *Boundaries* to calculate the percent and actual *Measurements.* (if calibrated) of the region of interest.

NOTE:
The system should be calibrated prior to performing Measurements. See part 1.1 for instructions.

Boundary - MANUAL:

1. Select the Manual Boundary button. If it is not shown on the screen, select the Stenosis option from the Cursor pull-down list (bottom right corner of image display).
2. To begin the trace of the first edge of the vessel, move the Cursor to the desired starting position.
3. Click and hold the left button on the Pointing Device. This sets the Starting Point for the trace.

Drag the center of the cursor along the vessel outline. The *Pointing Device* button can be clicked to set fixed points along the vessel's edge, but this is not necessary. As the cursor is moved, a line will extend from the *Last Point* set to the position of the *Cursor*.

To change any portion of the manual boundary that was just drawn: Click the right button on the *Pointing Device*. This will remove a section of the trace either back to the *Last Set Point*, or to the *Current Position* of the *Cursor*.

1. Double click the Pointing Device button when the tracing of the first vessel edge is complete. The Vessel Trace and the Cursor remain on the screen.
2. Repeat steps 1- 4 to trace the opposite edge of the vessel. The Stenosis Measurement Results window will appear when the Pointing Device button is double-clicked to set the last point (see following Figure).

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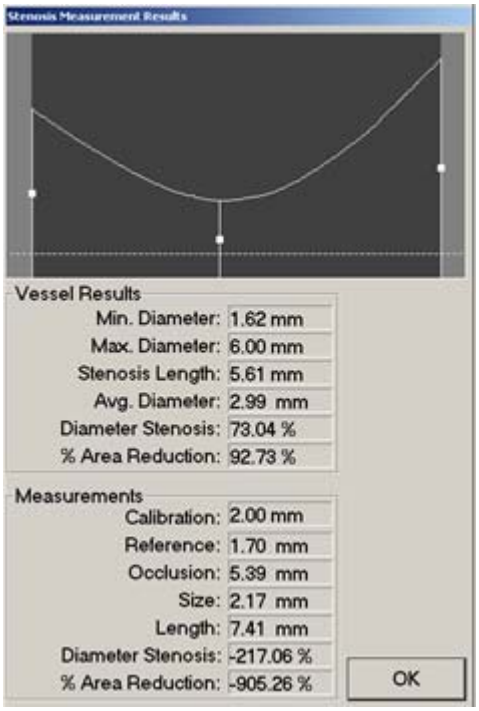
Boundary – Manual

A The graph represents the distance between the vessel edges.

B The vertical lines represent the width of the vessel at both ends and the minimum width found within the Vessel Trace.

C The End Points define the area of the vessel used for the calculations shown in this window.



Boundary – Edit

To adjust the trace points along the vessel:

1 Select the OK button in the Results window and then select Edit Boundary. Numerous Connection Points will highlight the two traces.

2 Use the Cursor to select and reposition any of these points in either of the EdgeTraces.

3 When the Edge Traces are set, select the Edit Bondary button again to accept the changes. The Connection Points will disappear.

To view the *Stenosis Measurements* using the changed edges, select the *Show Data* button.

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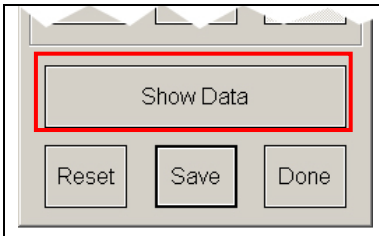
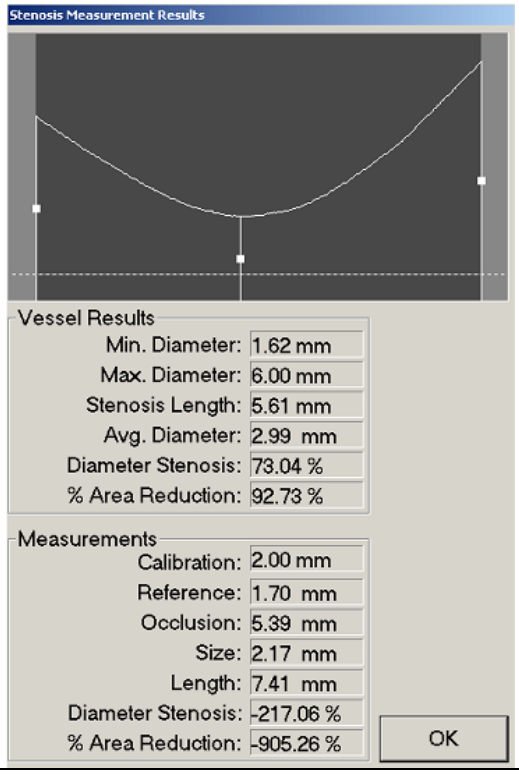
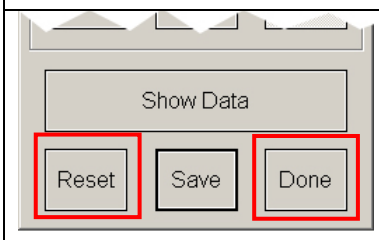


Select this feature button to display the results for any Stenosis feature button to display the results for any Stenosis Measurements functions recently performed. This window can be moved on the image screen by selecting the Title bar and dragging it to a different area on the screen.

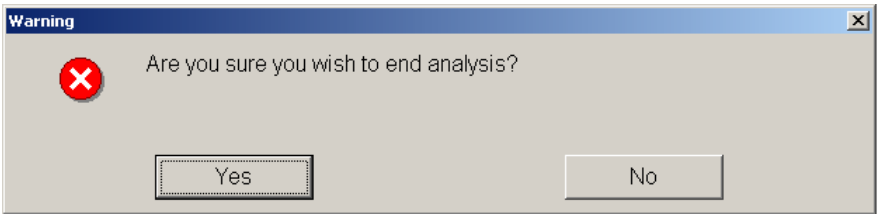




The *Reset* button removes all *Measurements* from the screen. The *Save* button saves *Measurements* made.

After saving, a Dialog for printing a report for the *Measurements* that have just been made becomes available. From this dialog, select the *Print feature* button.

The *Done* button closes *QCA* screen and returns the *Standard Control* box. A *Confirmation dialog* box will display after clicking on *Done* button.



- Select Yes to close dialog.
- Select No to Cancel or Exit function.

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11. Application Examples

11.1. Thorax

The radiography of the thorax can be executed with a focus-film distance of 150 cm (Figure 1).
As well, it is possible to execute tomography with a focus-film distance of 110 cm (Figure 2).

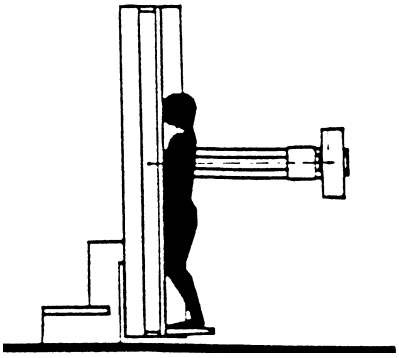

Figure 1

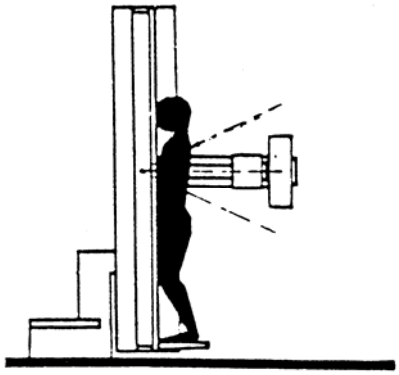

Figure 2

11.2. Digestive and alimentary tract

During the examination of the alimentary tract, the esophagus can be analyzed, in radioscopy in continuous manner, by following the course of the contrast mean after executing the centering on the hypopharynx.
This procedure can be carried out by translating the "Image Intensifier/X-ray tube column" group downwards (Figure 3).
The examination of the stomach can be executed by commanding a slight inclination of the tabletop, so that the patient can stand in a more comfortable position and, at the same time, better adhere to the tabletop so as to further reduce the patient-to-film distance.
Possible angles of the X-ray tube column can be useful to better put on evidence the little curve or duodenal bulb as well as the morphological characters of the stomach (Figure 4).
Should the patient not be able to keep the standing position, it will be possible to make him sit down on the footrest, according to what shown in Figure 5

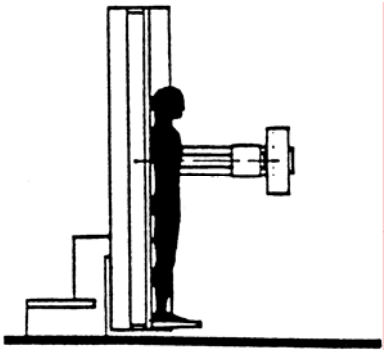

Figure 3

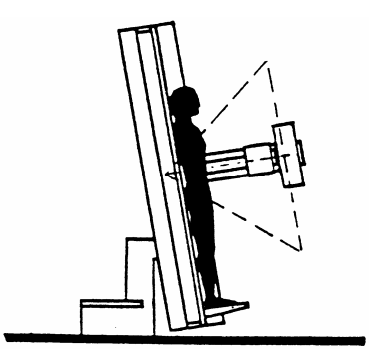

Figure 4

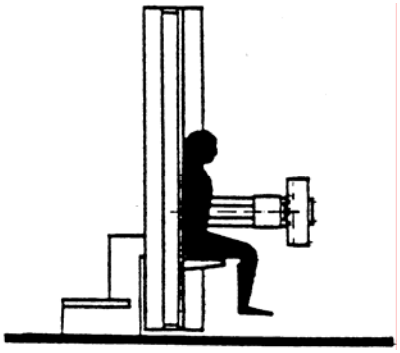

Figure 5

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11.3. Cervical column

Radiography can be executed, with the adequate incidences, on the cervical column of particularly tall patients too: it will be sufficient to move the "column/spot film device" group towards the upper end of the examination table.
The optional possibility to change the focal distance from 110 cm to 150 cm also allows to further reduce the geometrical blurring, ensuring a greater definition of the cervical bony structures (Figure 6).

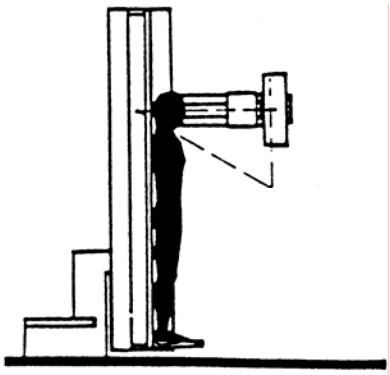

Figure 6

11.4. Abdominal and lumbar region

If you move the "Image Intensifier/X-ray tube column" group downwards, it will be possible to execute examinations on the abdominal region as well as on the lumbar column even with oblique projections, with no need for you to raise the patient (figure 7).

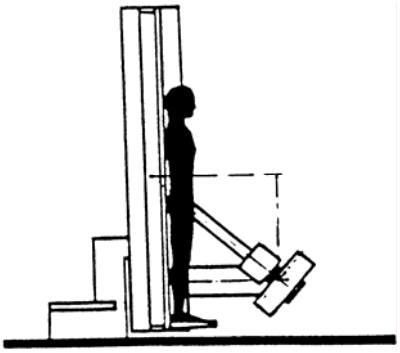

Figure 7

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11.5. Alimentary apparatus of the abdominal region

The patient laying in the prone horizontal position, the operator can easily execute all projections both on the duodenal tract (Figure 8) and small intestine (Figure 9).

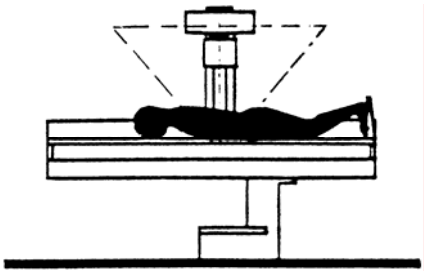

Figure 8

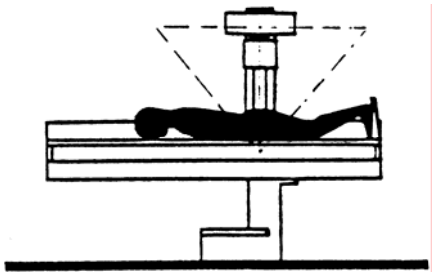

Figure 9

11.6. Urography and pyelography

Examinations of loins and urinary ducts may require the trendelenburg position as well as the execution of a tomograph (Figure 10).

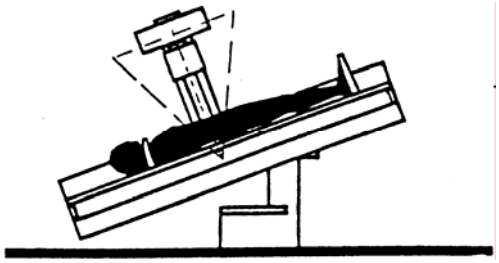

Figure 10

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11.7. Skeleton

The ample examination field that can be obtained, thanks to the movement of the "Intensifier/Stand" group, allows the operator to execute the most thorough analysis of the patient.
Examinations of the skull (Figure 11), back spine and lumbar column (Figure 12) can be executed with any incidences, as well as examinations of the legs (Figure 13).

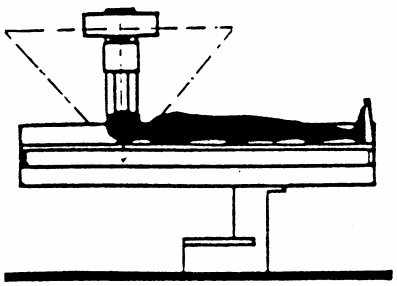

Figure 11

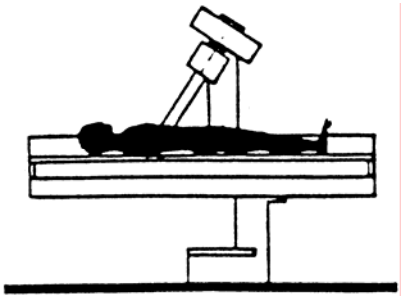

Figure 12

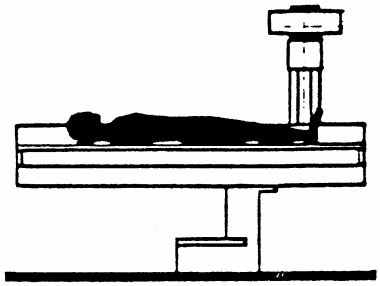

Figure 13

11.8. Arms

The T table also allows the execution of examinations with free cassette, with the patient both laying in the horizontal position and standing or sitting in an external position compared to the table, according to what shown in Figure 14.

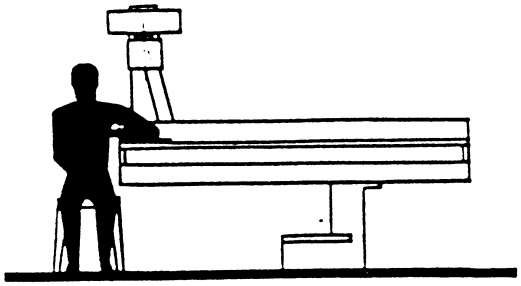

Figure 14

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11.9. Hysterosalpingography

The possibility of moving the "Intensifier/X-ray tube column" group towards the front end (or the back end) of the table, allows the operator to easily execute any radioscopic examinations and radiographs of the female genital apparatus (Figure 15).

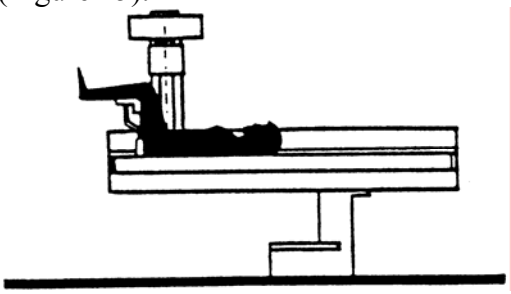

Figure 15

11.10. Phebography

If you command a light inclination of the tabletop, the patient can be positioned as shown in Figure 16: in this case you will be able to execute a phlebography under the radioscopic control.
You shall pay your attention in order to keep the "Intensifier/X-ray tube column" group in the lowest position and fix the footrest at about 10 cm from the lower end of the mobile plan.
After centering the patient as shown in Figure 16, you will execute the examination by moving the "Intensifier/X-ray tube column" group upwards.
Normally it is sufficient a 60 cm displacement: in this case the variable speed of the group displacement proves to be very useful.

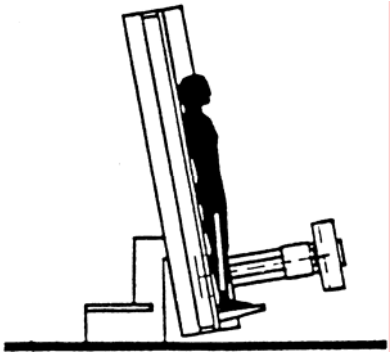

Figure 16

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12. Error codes

12.1. Positioner

When one of the following codes is present, the watch-dog activates automatically, a power drooping occurs and the control panel displays the number identifying the kind of alarm: it will be therefore necessary to reset the equipment.

CODE	TRANSMISSION	CAUSE
001	Tilting	*Potentiometer*
002		*Operation unit protection*
003		*Motor+dynamo/DAC inverted*
004		*Motor reversibility*
011	Elevation	*Potentiometer*
012		*Operation gear protection*
013		*Motor+dynamo/DAC inverted*
014		*Motor reversibility*
015		*Missing synchronism with the tilting*
021	Stand	*Potentiometer*
022[1]		*Operation gear protection*
023		*Stand in Mobile Area*
024		*Stand in angle*
025		*Stand in tomography*
026		*Stand in Mobile Area+contemporary angle*
027		*Motor reversibility*
028		*Angle > 44°*
031	SFD	*Potentiometer*
032		*Operation gear protection*
033		*SFD in Mobile Area*
034		*SFD in angle*
035		*SFD in tomography*
036		*SFD in Mobile Area+contemporary angle*
037		*Motor reversibility*
041	FD	*Zero input alarm*
042		*Fault operation*
051	Parallel collimator	*Potentiometer*
052		*Motor*
061	Orthogonal collimator	*Potentiometer*
062		*Motor*

[1] If the tabletop longitudinal displacement is available, the alarm code 022 may intervene also in case of damage on the tabletop's circuit.

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071	Iris collimator	*Potentiometer*
072		*Motor*
081	Parallel diaphragm	*Zero input alarm*
082		*Fault operation*
091	Crossed-diaphragm	*Zero input alarm*
092		*Fault operation*
101	Parallel jaws	*Potentiometer*
111	Perpendicular jaws	*Potentiometer*
121	Longitudinal cassette	*Zero input alarm*
122		*Fault operation*
131	Transversal cassette	*Zero input alarm*
132		*Fault operation*
133		*Central input alarm*
141	I.I.	*Zero input alarm*
142		*Fault operation*
143		*Low I.I. input alarm*
151	Grid	*Zero input alarm*
152		*Fault operation*
161	Longitudinal tabletop	*Potentiometer*
163		*Motor+dynamo/DAC inverted*
164		*Motor reversibility*
096		*CPU battery in discharge*
097		*Movement control at the equipment start up*
098		*Broken fiber optic / wrong transmission*
099		*Stand-by*
189÷196		*System error*
197		*Assi board error*
198		*Transmission error code on RS232 during installation*
199		*Transmission type error code on RS232*
200		*E2PROM not present / broken*
201		*Virgin E2PROM*
202		*Alarm error not managed*

For further explanations on the error codes and the relevant fault research, please make reference to the "Table– Fault research" Manual (Troubleshooting-5121726 Book1)

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12.2. Generator

The console will display status messages during normal and abnormal operation of the generator. This chapter contains tables of those messages and suggests actions to be taken should any malfunctions occur.
Warning messages are cleared automatically after they have been displayed for several seconds; error messages are cleared by pressing **OK** on the error message window. Some messages may not apply to your generator configuration.

12.2.1. Operator Messages

These messages indicate the status of the generator.

MESSAGE	DESCRIPTION
DAP not ready	The optional DAP is in its "warm up" state, and not ready to make DAP measurements.
Generator Ready	Indicates that the generator is ready to make an exposure.
Generator is offline	Indicates that the console is unable to communicate with the generator. Ensure that the generator is switched on if this message is present, and that the console cable is properly connected to J2 on the rear of the console. Consult your service representative if this does not solve the problem.
Unable to communicate with digital system.	Indicates that the generator is unable to communicate with the digital imaging system. Ensure that the digital imaging system is switched on. Consult your service representative if this problem persists.

12.2.2. Limit Messages

These messages indicate that an exposure has been requested that exceeds one or more limits.

MESSAGE	DESCRIPTION	ACTION
Air Kerma accumulated warning	The accumulated air kerma value has reached the programmed limit.	Reset the air kerma display.
Air Kerma rate warning.	The current air kerma rate exceeds the programmed air kerma rate limit.	Reduce the exposure.
Anode warning level exceeded	Anode has exceeded programmed warning level.	Wait for the anode to cool.
Calibration limit: selected parameter not calibrated	Requested parameter not calibrated.	Recalibrate X-ray tube or select a calibrated parameter. (Consult your service representative.)

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MESSAGE	DESCRIPTION	ACTION
DAP accumulated value exceeded	The DAP accumulated value has exceeded the programmed dose accumulated limit.	Reset the DAP.
DAP rate value exceeded	The DAP rate value has exceeded the programmed dose rate limit.	Reduce the dose rate.
Fluoro Focus Warning	The small focus is not working, and the generator is performing fluoroscopy on the large focus	Consult your service representative.
Fluoro timer warning level exceeded	Fluoro interval timer ≥ 5.0 mins.	Reset fluoro timer.
Generator AEC density limit	Requested density not programmed.	Select another density or request that those steps be programmed by your service representative.
Generator duty cycle limit.	The X-ray generator has reached its duty warning limit.	Re-evaluate technique factors. Allow generator to cool if possible. If exposures are continued, serious generator damage may result due to overheating.
Generator kV limit	Requested kV not allowed as generator kV limit has been reached.	None.
Generator kW limit	Requested parameter not allowed as generator kW limit has been reached.	None.
Generator mA limit	Requested mA not allowed as generator mA limit has been reached.	None.
Generator mAs limit	Requested mAs not allowed as generator mAs limit has been reached.	None.
Generator ms limit	Requested ms not allowed as generator ms limit has been reached.	None.
Generator PPS limit	Generator PPS limit has been reached.	None.
Housing heat warning	X-ray tube housing heat has exceeded housing warning limit.	Wait for the tube housing to cool.
Invalid communication parameter	Generator detected invalid parameter within received message, message ignored.	Select valid parameter.
Parameter limit	The requested tomo parameter has reached its limit.	None.
Please deselect tomo table	Request operator to deselect tomo table.	Deselect the tomo receptor.
Please select tomo table	Request operator to select tomo table	Select the tomo receptor.
The selected tomo angle is not valid	Selected tomo angle is not available.	

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MESSAGE	DESCRIPTION	ACTION
Tube kV limit	Requested kV not allowed as tube kV limit has been reached.	None.
Tube kW limit	Requested parameter not allowed as tube kW limit has been reached.	None.
Tube mA limit	Requested mA not allowed as tube mA limit has been reached.	None.
Tube mAs limit	Requested mAs not allowed as tube mAs limit has been reached.	None.

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12.2.3. Error Messages

These messages indicate that an error has occurred.

ERROR CODE	MESSAGE	PROBLEM	ACTION
E001	Generator CPU EPROM checksum error		Consult your service representative.
E002	Generator CPU EEPROM data checksum error		Consult your service representative.
E003	Generator CPU NVRAM error		Consult your service representative.
E004	Generator CPU Real Time Clock error.	Generator CPU real time clock is not functioning.	Reset time and date. Consult your service representative.
E005	Main Contactor Error		Consult your service representative.
E006	Rotor Fault		Power unit off and retry rotor start. Consult your service representative.
E007	Filament Fault		Consult your service representative.
E008	mA Fault		Consult your service representative.
E009	Power Supply Not Ready	Power supply is not ready to make an exposure.	Retry exposure. Consult your service representative.
E010	No kV During Exposure		Consult your service representative.
E011	mA During Exposure Too High		Consult your service representative.
E012	mA During Exposure Too Low		Consult your service representative.
E013	Manually Terminated Exposure	Operator released exposure switch during exposure.	Re-take exposure if necessary. Consult your service representative.
E014	AEC Back-up Timer - Exposure Terminated	AEC exposure exceeded allowed back up time.	Check exposure technique settings. Consult your service representative.

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ERROR CODE	MESSAGE	PROBLEM	ACTION
E015	AEC mAs Exceeded - Exposure Terminated	AEC exposure exceeded allowed back up mAs.	Check exposure technique settings. Consult your service representative.
E016	Tomo Back-up Timer - Exposure Terminated	Tomo exposure exceeded back up time.	1. Check exposure technique settings. 2. Increase tomo back up time if necessary.
E017	Uncalibrated Exposure Parameter		Consult your service representative.
E018	Preparation Timeout	Generator has been in prep state too long.	Reduce length of time in prep state.
E019	Anode Heat Limit	Selected parameters will cause X-ray tube to exceed its programmed anode heat limit.	Reduce parameters or wait for tube to cool.
E020	Thermal Switch Interlock #1 Error	X-ray tube # 1 too hot and its thermal switch has opened.	Wait for X-ray tube # 1 to cool.
E021	Thermal Switch Interlock #2 Error	X-ray tube # 2 too hot and its thermal switch has opened.	Wait for X-ray tube # 2 to cool.
E022	Door Interlock error	Door is open.	Close door.
E023	Collimator Interlock Error	Collimator is not ready.	Check collimator.
E024	Cassette Interlock Error	Cassette is not ready.	Check cassette.
E025	Image Intensifier Safety Interlock Error	II safety is not ready.	Check II safety.
E026	Spare Input Interlock Error	Spare input is not ready.	Consult your service representative.
E027	Receptor Timeout Error - Receptor did not respond within the timeout period		Consult your service representative.
E028	Prep Input Active During Initialization Phase		Consult your service representative.
E029	X-Ray Input Active During Initialization Phase		Consult your service representative.
E030	Fluoro Input Active During Initialization Phase		Consult your service representative.

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ERROR CODE	MESSAGE	PROBLEM	ACTION
E031	Remote Fluoro Communication Error	Communication error detected with remote fluoro control unit.	Turn power off and then on to Reset Generator. Consult your service representative.
E032	Console Communication Error	Generator has detected error in communication to console.	Turn power off and then on to reset generator. Consult your service representative.
E033	Warning Lithium Battery Voltage Low		Consult your service representative.
E034	+12VDC Error		Consult your service representative.
E035	-12VDC Error		Consult your service representative.
E036	+15VDC Error		Consult your service representative.
E037	-15VDC Error		Consult your service representative.
E038	Calibration Data Corrupt Error		Consult your service representative.
E039	AEC Data Corrupt		Consult your service representative.
E040	Fluoro Data Corrupt		Consult your service representative.
E041	Receptor Data Corrupt		Consult your service representative.
E042	Tube Data Corrupt		Consult your service representative..
E043	High Voltage Error - kV detected in non X-ray state		Switch OFF generator. Prevent further use of generator, then. consult your service representative.
E044	Invalid Communication Message	Received communication message not valid and ignored.	Reset error.
E045	Communication Message Not Supported	Received message valid, but not supported by this system.	Reset error.
E046	Mode Inhibited	Received message valid, but not allowed during present state.	Reset error.
E047	Fluoro Timer Limit	Fluoro Timer has exceeded time limit.	Reset Fluoro timer.

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ERROR CODE	MESSAGE	PROBLEM	ACTION
E048	Focus mismatch error		Consult your service representative.
E049	Not Enabled	Requested function has not been programmed to be enabled.	Consult your service representative.
E050	Generator Limit Data Corrupt		Consult your service representative.
E051	AEC Feedback Error (No Feedback Signal Detected)	Generator has detected no feedback signal from AEC device.	Check that X-ray tube is pointing at correct AEC device. Consult your service representative.
E052	High Small focus filament current error in standby		Consult your service representative.
E053	High Large focus filament current error in standby		Consult your service representative.
E054	AEC Reference out of range		Consult your service representative.
E055	No fields selected in AEC mode	AEC enabled but no fields are selected.	Select AEC field(s).
E056	Receptor Disabled		Consult your service representative.
E057	AEC Stop Signal In Wrong State		Consult your service representative.
E058	Console Back-up Timer		Consult your service representative.
E059	Housing Heat Limit Exceeded	X-ray tube housing has exceeded its heat limit.	Wait for tube to cool.
E060	High kV Error		Consult your service representative.
E061	Low kV Error		Consult your service representative.
E062	EXP_SW Signal Active in Standby State		Consult your service representative.
E063	Factory Defaults Set		Consult your service representative.
E064	No Exposure Released		Consult your service representative.
E065	Tomo Device Error		Consult your service representative.
E066	No Sync Signal		Consult your service representative.

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ERROR CODE	MESSAGE	PROBLEM	ACTION
E067	Power Supply Duty Cycle Limit	Power supply duty cycle limit exceeded.	Re-evaluate technique factors. Allow generator to cool if possible. If exposures are continued, serious generator damage may result due to overheating.
E069	mAs timeout	The mAs has exceeded its estimated time (falling load only).	Increase mA and/or check technique.
E070	Generator software key error		Consult your service representative.
E071	DAP overflow error	The accumulated DAP value exceeds the display limit.	Reset the DAP.
E072	DAP device error	The DAP device is not functional.	Consult your service representative.
E073	DAP data error		Consult your service representative.
E074	Table Communication Error	A communication error has occurred with the table.	Ensure that the table is powered on. Consult your service representative.
E075	Table Emergency Stop	The table emergency stop has been activated.	Reset the table emergency stop.
E076	High Micro Focus Filament Current Error	Generator detects micro focus filament current greater than limits in standby mode.	Consult your service representative.
E077	Active Dose Reduction Cable Interlock error	Ground (ADR tank interlock) at J3-9 not detected.	Consult your service representative.
E078	Active Dose Reduction Error	ADR system discharging always, or not discharging at all.	Consult your service representative.
E079	Procedure Aborted	The procedure has been aborted.	Retry the procedure, or troubleshoot the procedure in question.
E080	Bucky orientation error.	The Bucky tray has failed to properly change orientation.	Consult your service representative.
E083	Air Kerma overflow error	The accumulated AK value exceeds the display limit.	Reset the air kerma display.
E084	Air Kerma data error	The air kerma calibration data is corrupted.	Consult your service representative.

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13. Maintenance

13.1. Planned maintenance program

It is recommended that the service engineer initiates a periodic maintenance program with the frequency given in the following schedule.

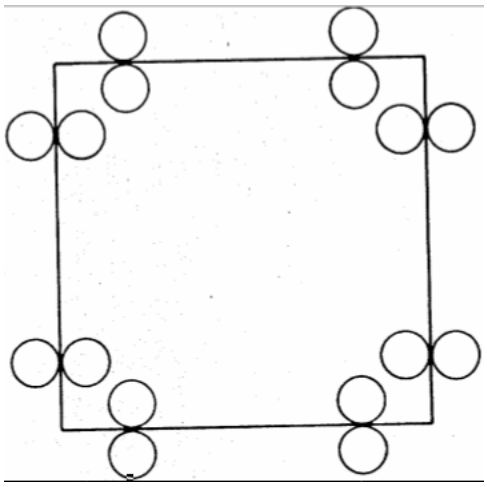
WARNING:
Should any meter, control, indicator or acoustic signal fail to operate, do not use the GE Precision RXi until a repair has been made.

13.1.1. Luminous field dimensions verification

Procedure applying to the verification of the dimensions of the luminous field delimited by the collimator and of the alignment of the luminous field compared with the X-ray field

ATTENTION:
The following procedures require the use of x-rays. You shall take proper measures so that no part of your body is exposed to direct or indirect radiation.

- Place a 24x30 cm X-ray cassette complete with the film on the tabletop and align it within the luminous beam of the collimator, after pressing the push-button for switching on the relevant lamp.
- Adjust the collimator knobs so as to obtain a field of almost 150x150mm .
- Place 16 coins (or washers) on the cassette as shown in the following figure.
- Place each pair of coins (or washers) so that the most internal ones are illuminated.
- The tangential point will define the edge of the luminous field.



Command an exposure with about 50 kV and 4 mAs and develop the film. By analyzing the radiogram you have obtained, it will be possible to evaluate the coincidence between the luminous beam and the radiation beam.

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13.1.2. Warm-up procedure

Use this procedure when the generator is first turned on for the day, or when it has not been used for several hours. This procedure provides for exposures at medium power before the tube is used at maximum mA or kV values. This will reduce stress on the X-ray tube. No test setup is required.

- Choose the tube to be warmed-up by selecting an image receptor that is programmed to select the desired tube. Close the collimator blades.
- Select the following:
  - 80 kV.
  - Large focal spot.
- For a 200 to 300 kHU tube use approximately 160 mAs per exposure. For a 300 to 400 kHU tube use approximately 200 mAs per exposure. Depending on the X-ray tube power rating, select either 100 mA or 200 mA
- Make one (1) to three (3) exposures (depending on tube loading) at 30 second intervals.

13.1.3. Daily checks (Before starting the examination)

Before starting the examination:

- clean the tabletop eliminating possible residues of contrast means;
- carry out a visual inspection of the equipment's movements, displays and signal lamps;
- make sure that the accessories required to hold or fix the patient are properly secured to the equipment, with special regard to the hand-grips;

13.1.4. During the examination

- the exposure signal can light on only during the X-ray emission;
- check the patient immobilization (by means of the hand-grips);
- command the movements of the equipment only after making sure that these can not damage either the patient or other people.

13.1.5. Monthly checks

- Carry out a functioning check of the collimation automatic control. Please make reference to the chapter “Safety” too.
- Execute a test on the functioning of the emergency stop push-button.
- AEC and ABS circuits

CAUTION:
The aec and abs verification procedures require the production of x-rays. Observe correct operating procedures, and take appropriate precautions against x-radiation.

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WARNING:
Refer all servicing to appropriate service personnel who are trained to service this equipment and who are familiar with the potential hazards associated with this equipment.

NOTE:
Maintenance schedule frequency may be determined by certain regulatory requirements of the country or state in which the installation is located. Always check the local codes and regulations when determining a maintenance schedule.

13.1.5.1. AEC functional check

The following procedure may be used to verify that the AEC circuits are functioning on generators equipped with AEC (Automatic Exposure Control).

1 Switch the console and generator ON, and select an appropriate radiographic image receptor.
2 Align the X-ray tube and the selected image receptor such that the central ray is directly over the center field of the AEC pickup device. Set the focal spot to film plane distance to 40 in. (1 m).
3 Select AEC mode of operation. Select center field, large focus.

MINIMUM EXPOSURE TIME:

4 With no object in the radiation field, adjust the collimator or beam limiting device to project a 10 in. X 10 in. (24 cm X 24 cm) field at the image receptor.
5 Select 80 kV, 100 mA, and a backup mAs of 50 if it is operator selectable. If this is not operator selectable, the default AEC backup settings must be used. Refer to “ms / mAs up / down buttons and display” in section 4 to determine the AEC backup mode that has been programmed.
6 Make an exposure and verify that the POST mAs reading is ≤ 2 mAs.

MAXIMUM EXPOSURE TIME:

7 Close the collimator or beam limiting device completely. Place a folded lead apron over the image receptor.
8 Select 60 kV, 100 mA, and a backup mAs of 50 if it is operator selectable. If this is not operator selectable, the default backup settings must be used.
9 Make an exposure and verify that the error message AEC Feedback Error (No Feedback Signal Detected), AEC Back-up Timer - Exposure Terminated, or AEC mAs Exceeded - Exposure Terminated is displayed on the console after the exposure has terminated. This confirms that the exposure has continued until it was terminated by the AEC backup timer.

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13.1.5.2. ABS functional check

The following procedure may be used to verify that the ABS circuits are functioning on generators equipped with ABS (automatic brightness stabilization).

1 Switch the console and generator ON, and select an appropriate fluoroscopic image receptor.
2 Select ABS mode.
3 Open the collimator or beam limiting device shutters to maximum. With no object in the image field, press the fluoro footswitch. Confirm that the collimator or beam limiting device is fully open by observing the monitor.
4 While continuing to press the fluoro footswitch, note the fluoro kV display at the control console or remote fluoro control. This should be less than 55 kV.
5 Close the collimator or beam limiting device and press the fluoro footswitch. With no object in the image field, ensure that the radiation is fully blocked by observing the monitor. If necessary, cover the image intensifier with lead aprons to block all radiation.
6 While continuing to press the fluoro footswitch, note the fluoro kV display at the control console or remote fluoro control. This should be the maximum available fluoro kV, 110 kV or 125 kV (depending on whether the upper fluoro kV limit has been set to 110 kV or 125 kV).
7 Place an absorber (20 cm of water, or 1.5 in. (3.8 cm) of pure aluminum, or equivalent) in the center of the image field.
8 Press the fluoro footswitch. While viewing the absorber on the monitor, open the collimator or beam limiting device sufficiently to cover as much of the absorber as possible. Ensure that the X-ray beam does not extend beyond the sides of the absorber as stray radiation will adversely affect the kVp reading in the next step.
9 While continuing to press the fluoro footswitch, note the fluoro kV display at the control console or remote fluoro control. This should stabilize between 70 and 80 kV.

13.1.5.3. Console and miscellaneous generator checks

The user must routinely check the X-ray equipment for apparent defects or damage. Report any apparent defects or irregular operation of any equipment to service personnel immediately, and discontinue use of the suspected faulty equipment until repairs are made. Continuing operation with faulty equipment may present various safety hazards, including risk of increased radiation.

1. Check all visual displays (warning and status lights, technique displays and indicators, etc) for normal operation.
2. Check all audible indicators (speakers, beepers, etc) for normal operation, and check that the loudness settings are adequate for the environment.
3. Check all interconnect cables and connectors for damage.
4. Switch off the equipment and check and clean the visible/external fans.

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13.1.6. Every 6 months and whenever a related certifiable X-ray component is replaced

WARNING:
The system must be switched off and disconnected from the power from several minutes before start the first steps of this procedure.

- Clean and re-grease all HV connections using vapor proof compound.
- Check that all HV connections are tight.
- Clean the control console, remote fluoro control (if used) and main cabinet as needed. Refer to section on cleaning, before proceeding.
- Ensure that there are no obstructions blocking the ventilation holes at the top of the cabinet, or the louvers on the front door panels.
- Perform the X-ray tube auto calibration routine.
- Verify the calibration of the generator.
- Perform any additional tests required by laws governing this installation.
- Check for accurate and correct functioning of all controls, indicators and movements.
- Check collimator alignment and field limitation. Check light level, beam alignment and centering.
- Check fluoroscopic entrance exposure rate. Check image intensifier entrance-plane dose rate.
- Calibrate and align image intensifier assembly and camera system.
- Check all mechanical movement limits, physical integrity of complete system and lubrication.
- Check the catch system of the footrest and adjust
- Perform Touch Screen calibration for the touch sensitive interface
- For units with the AK (Air Kerma) option, verify the air kerma calibration every 6 months or as requested by the local regulations

13.1.7. Every 12 months

WARNING:
The system must be switched off and disconnected from the power from several minutes before start the first steps of this procedure.

- Examine the following for any visible damage and replace any damaged components:
  - The exterior of the control console and remote fluoro control if used, including the membrane switch assembly.
  - The cable between the control console and the generator main cabinet and between the remote fluoro control (if used) and generator main cabinet.
  - The hand switch and fluoro footswitch (if used) and the cables connecting these to the console.
- Open the generator cabinet and examine the unit for any visible damage: missing or loose ground connections, oil leaks, damaged cables etc.
- Check maximum earth (ground) resistance of total system.
- Check AC and DC supply voltages.
- Check fans.

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- Ensure secure fitting and check for dust and corrosion on PCBs and connectors
- Check electrical and mechanical settings on all motorized movements
- Check interlocks for correct functioning
- Make reference to the positioner periodical maintenance documentation
- Backup the current APR file
- For digital systems only: if necessary update the Windows 2000 Professional Operating System
- Perform a complete system backup and for digital systems perform a Norton Ghost backup.

13.1.7.1. Overhead Tube Suspension

- Check condition of sheaths and electrical cables
- Cleaning of the ball bearings sliding guides
- Cleaning and lubrication of bearings and pins
- Check and regulation of the bearing functions and play
- Efficiency of the centering and alignment devices
- Tightening of the screwed parts
- Efficacy of the braking devices
- Efficiency of the control and signal devices
- Condition of the steel ropes
- Condition of the ropes winding drums
- Condition of the ropes pulleys
- Efficiency of the main rope safety device
- Condition of the balancing springs

13.1.7.2. Wallstand

The manufacturer has no responsibility in case of bad working, which can be caused by negligence or elusion of the basic maintenance rules listed below.
The preventive maintenance must be exclusively done by qualified and authorized personnel. Subject to agreement with our administration department, we are at full disposal to supply the necessary technical support.

- Cleaning of the ball bearings sliding guides
- Tightening of the screwed parts
- Efficacy of the braking devices
- Check and lubricate the potter carriage chain with proper chain lubricating spray

13.1.8. Every 5 years

Replace the lithium batteries on the CPU board in the control console, on the generator CPU board in the main cabinet and on the positioner CPU board with the same manufacturer and type as identified on the original batteries.

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13.1.8.1. Overhead Tube Suspension

Overhead Tube Suspension steel ropes replacement.

13.1.9. As governed by local regulations

Check and recalibrate the DAP meter in the generator

13.2. Periodic test of the performance constancy

Some tests applying to the functional performance constancy should be carried out on a regular basis at least every 12 months; particularly, these tests should be executed immediately after the preventive and corrective maintenance operations.
The constancy tests should be executed by qualified personnel of the Radiodiagnostics Department (IEC1223-1).
The following procedure has been carried out in compliance with IEC 61223-2-11 International Standards.

13.2.1. Constancy periodical test

The performance constancy tests on an X-ray equipment aim to detect possible considerable variations, and their importance, among basic values (considered as to be reference values) being measured in a preceding evaluation (possibly at the installation date, after the acceptance tests).
Since the procedure to be followed for executing the functioning constancy of the components of an X-ray equipment is based upon the evaluation of radiograms of proper test objects, before starting the constancy checks, it is necessary to verify the basic values of the constancy parameters of the development equipment of the films (automatic developing system), that is:

- optical density of the support plus fog
- sensitivity factor
- contrast factor

This is obtained by executing the exposure, in specific conditions, of the test films before developing them by means of the developing system concerned; a sensitometer shall be used capable to emit a quantity of light absolutely repeatable and with a characteristic spectral distribution of the reinforcement screen type being used in the X-ray cassettes that are used for the following controls.

ACCESSORIES USED FOR EXECUTING THE TESTS

OBJECT	TYPE OR MARK	SERIAL NUMBER
X-ray Cassettes		
Reinforcement screen		
X-ray films		

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OBJECT	TYPE OR MARK	SERIAL NUMBER
Developing equipment		
Date of bath		
Sensitometer		
Densitometer		

Test parameters, symbols and measure units

MEASURED ITEM	SYMBOL	UNIT
High voltage to the X-ray tube	U	kV
Current inside the X-ray tube	I	mA
Exposure or charge time	T	s, ms
Reaction time of the AEC	t_{reac}	ms
Current-time product	Q	mAs
Transmission Kerma (intensity)	K_T $(K(\cdot)_B)$	mGy (mGy/s)
Air Kerma (intensity)	K_B $(K(\cdot)_B)$	mGy (mGy/s)
Characteristic air Kerma	K_{Tchar}	(mGy m^2)/mAs
Attenuation factor	T_R	-
Filter value (filtration of equivalent quality)	-	mm Al
Resolution in pair of lines	R	lp/mm
Optical density	D	-
Tabletop-to-focus distance	r_T	cm
Image receptor-to-focus distance	r_b	cm

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13.2.2. Verification of the radiation output from the X-ray assembly

The condition to be carried out for executing this test is described in the following figure:
Place an empty X-ray cassette (without any film) in the cassette-holder
The test is executed with the tabletop in the following positions:

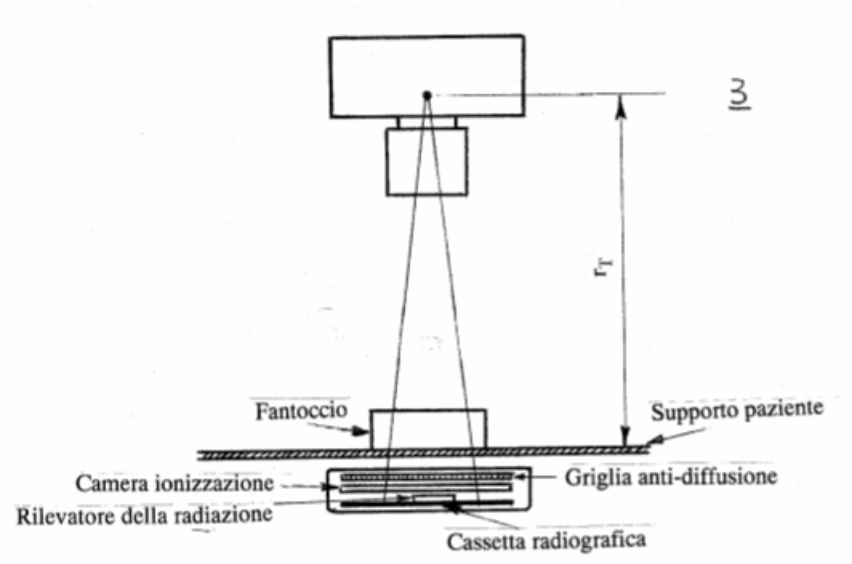
- ☐ horizontal
- ☐ vertical

Verification of the exposure time in manual control modality

U		t		I	Focus	r_T	a	K_B
selected	measured	selected	measured					
60 kV	.... kV	.... s	.... s	..... mA	large	.... cm	.... cm	
80 kV	.... kV	.... s	.... s	..... mA	large	.... cm	.... cm	
100 kV	.... kV	.... s	.... s	..... mA	large	.... cm	.... cm	

Verification in automatic exposure modality

U		I	Q	Focus	r_T	a	K_B
selected	measured						
60 kV	.... kV	..... mA	... mAs	large	.... cm	.... cm	
80 kV	.... kV	..... mA	... mAs	large	.... cm	.... cm	
100 kV	.... kV	..... mA	... mAs	large	.... cm	.... cm	



Operator's name: .....
date: .....
Measure instruments: .....

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13.2.3. Verification of the radiation on the entrance surface of the image receptor

The situation to be realized for executing this test is indicated in the following figure.
Position the Radiation detector in the center of the X-ray cassette.
A cassette complete with a film must be inserted in the cassette-holder for each exposure to be executed.
The test shall be executed with the tabletop in the following positions:

- ☐ horizontal
- ☐ vertical

Verification of the exposure time in manual control modality

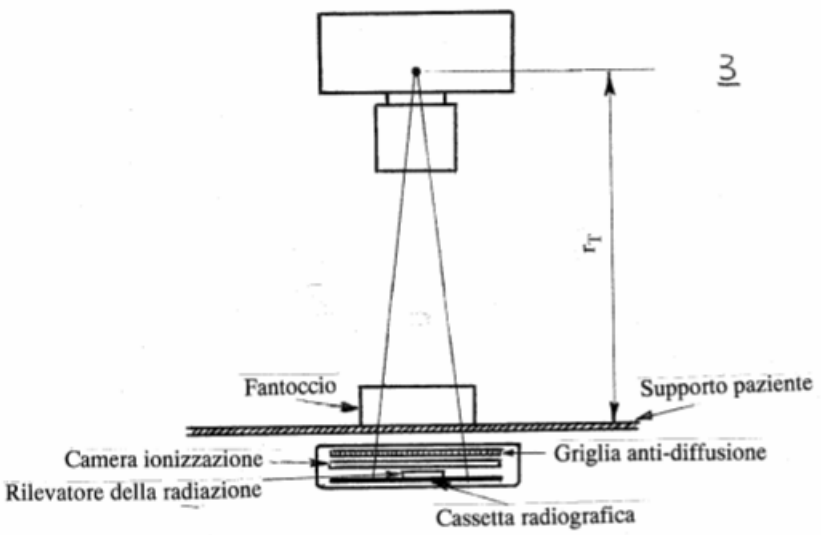
U	t	I	Focus	r_T	K_T	D
60 kV	.... s	..... mA	large	.... cm		
80 kV	.... s	..... mA	large	.... cm		
100 kV	.... s	..... mA	large	.... cm		

Annex A1, A2, A3

Verification of the exposure time in Automatic exposure modality

U	Dominant	Q	Focus	r_T	K_T	D
60 kV	Zone I	..... mAs	large	.... cm		
80 kV	Zone II	..... mAs	large	.... cm		
100 kV	Zone III	..... mAs	large	.... cm		

Annex: B1, B2, B3



Operator's name: .....
date: .....
Measure instruments: .....

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13.2.4. Control of the X-ray beam alignment and geometry

By means of a tape-line or similar instrument, you shall measure that the difference between the set value and the real value of the distance between the focus and the image receptor is within ± 1%:

Set value	Measured value
..... cm	..... cm

Verify the horizontal (or vertical) level of the tabletop and file the difference:

Difference compared with : - horizontal - vertical
.....

Verify that the maladjustment of the X-ray beam compared with the center of the image receptor is not higher than 2% of the FFD (X value):

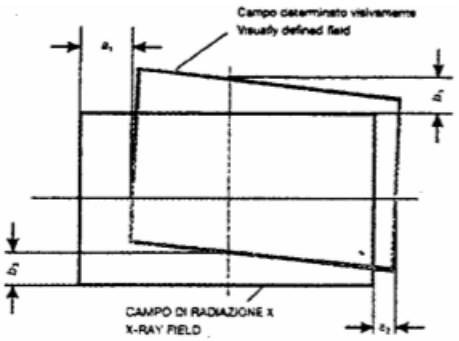
Tabletop position	**r_B**	**Measured maladjustment**	**X**
Horizontal	min ..... cm		
	max ..... cm		
Vertical	min ..... cm		
	max ..... cm		

Alnnex: E1, E2

Verify that the difference between the luminous field delimited by the collimator and the X-ray field is not higher than 2% of the FFD (X value):

Tabletop position	**r_B**	**|a1|+ |a2|**	**|b1|+ |b2|**	**X**
Horizontal	min ..... cm			
	max ..... cm			
Vertical	min ..... cm			
	max ..... cm			

Annex: F1, F2



Verify that the difference between the X-ray field and the image receptor surface is not higher than 3% of the FFD on each side (Y value) and not higher than 4% compared with the sum of the two sides (Z value):

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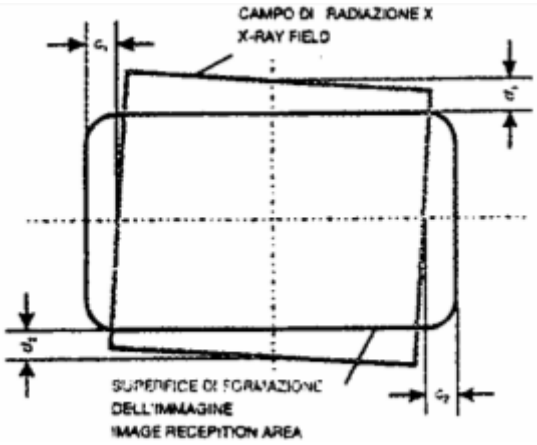
r_B	|c1| + |c2|	|d1| + |d2|	Y	|c1| + |c2| + |d1 |+ |d2|	Z
min ..... cm					
max ..... cm					

Annex: G1, G2



Verify the correspondence between the X-ray field dimensions and the indications specified on the equipment.

	Measured value	Set value
Longitudinal axis		
Transversal axis		

Operator's name: .....
date: .....
Measure instruments: .....

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13.2.5. Verification of the image resolution power and contrast

Place on the tabletop, in correspondence of the X-ray beam, a test object of the TO G.S.2 FAXil type or a similar one.
Insert a 24x30 cm size X-ray cassette, complete with a film, in the cassette-holder of the potter-bucky or the SFD (spot film device).
Place a Cu filter on the outlet of the collimator or, anyway, as nearest as possible to the tube focus.
Select the large focus, select 70 kV and adjust the current to the tube so as to obtain a base blackening density of the developed film of almost 1.5.
Execute an exposure and develop the film.
Repeat all the operations selecting the small focus.

MEASURE AND FILE THE FOLLOWING DATA

	Q	R	No. of 0.5 mm visible details	No. of 5.6 mm visible details	No. of 11 mm visible details
Large focus	..... mAs	..... pl/mm			
Small focus	..... mAs	..... pl/mm			

Annex: H1, H2

Remove the 1 mm Cu filter and select the large focus; select 50 kV and adjust the current to the tube so as to obtain a base density of the developed film of almost 1.5.
Execute an exposure and develop the film.
Repeat all the operations selecting the small focus.

MEASURE AND FILE THE FOLLOWING DATA

	Q	R	No. of 0.5 mm visible details	No. of 5.6 mm visible details	No. of 11 mm visible details
Large focus	..... mAs	..... pl/mm			
Small focus	..... mAs	..... pl/mm			

Annex: L1, L2

Operator's name : .....
Date : .....
Measure instruments : .....

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13.2.6. Checks applying to the Image Intensifier

Intensifier tube type ..... Serial Number .....

Monitor type ..... Serial Number .....

TV Camera type ..... Serial Number .....

VERIFICATION OF THE RADIOSCOPIC PARAMETERS

Parameter	Functioning conditions	Indicated value	Measured value	error %
kV min	mA min			
	mA max			
kV max	mA min			
	mA max			
mA	50 kV	0.5 mA		
	50 kV	1 mA		
	50 kV	3 mA		
	70 kV	0.5 mA		
	70 kV	1 mA		
	70 kV	3 mA		
	100 kV	0.5 mA		
	100 kV	1 mA		
	100 kV	3 mA		

Operator's name : .....
Date : .....
Measure instruments : .....

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13.2.7. Check of the alignment and geometry of the X-ray beam

Verify that the maladjustment of the X-ray beam compared with the centre of the image on the monitor is not higher than 2% of the FFD (X value):

Tabletop position	r_B	Measured maladjustment	X
Horizontal	min ..... cm		
	max ..... cm		
Vertical	min ..... cm		
	max ..... cm		

Verify that the X-ray field is selected so as to cover the image reception area according to the following limits (IEC 60601-1-3) :

☐ The X-ray field is completely within the image reception area and its edges are visible.

☐ The X-ray field has a rectangular shape and can extend beyond the circular reception area, but neither its length nor its width exceed the diameter of the image reception area.

Length of the X-ray field: cm	Maximum longitudinal diameter visible on the monitor: cm	Width of the X-ray field: cm	Maximum transversal diameter visible on the monitor: cm .....

Annex O

Operator's name: .....
Date: .....
Measure instruments: .....

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13.2.8. Verification of the response of the Dose Automatic Control

Place a phantom of 25 mm Al or 15 cm of water so as it can completely intercept the image field; place the detection chamber of a dosimeter on the input surface of the intensifier tube.

Activate the fluoroscopy command and wait until the high voltage is stabilized; read and file the kV value (U1) and the air Kerma value at the intensifier input (K_B1).

Add to the Al (or water) phantom a thickness layer of 1.5 mm of Cu and wait until the high voltage is stabilized once more: file the new kV value (U2) and the air Kerma at the intensifier input (K_B2).

Remove the 1.5 Cu thickness layer and wait until the high voltage is stabilized: file the new kV value (U3) and the air Kerma value at the intensifier input (K_B3).

Repeat this operation for each magnification factor of the Image Intensifier.

	U1	(K_B1)	U2	(K_B2)	U3	(K_B3)
Max field						
1st zoom						
2nd zoom						
3rd zoom						

Operator's name: .....
Date: .....
Measure instruments: .....

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13.2.9. Contrast Transfer and Dynamic Range (Spot)

This paragraph is applicable to digital systems only!

To access the Digital Service Application:
Right click on the image display portion of the User Application screen to bring up the options menu Select Start Service Application.
The logon window will appear type "serviceapp" as user name and the proper password.

Purpose	People Required	Tools Required
To verify contrast transfer, dynamic range, and acquisition look up tables (LUTs) in spot mode.	1 FE	GE cardiovascular (CV) phantom, 8" model

Estimated Duration	Pre-requisites	Safety issues
20 min	System calibrated	Radiation

Procedure

1) Set up the system with the following parameters:
   a) Phantom Location: heart/lead facing upward on monitor
   b) SID: 115 cm
   c) SOD: place the C.V. phantom on the tabletop
   d) Grid: in
   e) Additional Filter: none
   f) System: Digital Service Application
   g) Mode: Spot
   h) Technique: 75 kVp, 50 mA, phototimed AEC, density to 0
   i) II FOV (mag): 9"
   j) Focal Spot: small 0.6 mm
   k) Collimation: collimate tightly around phantom so that no raw radiation is showing
   l) Edge: off
2) Enter Digital Service Application.
3) Select Calib menu > System Manual tab > Video Level tab > Acq LUT tab, and check the Spot Camera Mode Acquire LUT is set to "Linear WC." Exit the Calibration menu.
4) Go to the IQA menu.
5) Click on the "ROI Density" tab.
6) Click "Run This Step" button to display ROI.
7) Ensure the "ROI Size" selected is 32x32.
8) Select the "Update Continuously" option.
9) Acquire a spot image with AEC mode.
10) Change from AEC to mA/ms mode (stay at 50 mA) and adjust the mAs and SID to get the Heart near its target of 2863 for a 12"II and 3250 for a 16" II.
11) Record the post mAs and final SID below.
12) Drag the ROI to each region (as close to center of phantom as possible, or to the center of the Lead disk) and record the Density value below.

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Results

Post mAs _____

SID: _____

Density (12" II)

Lung: _____ (target 3633, acceptable range 3581-3680)
Heart: _____ (target 2873, acceptable range 2863-2883)
Mediastinum: _____ (target 1515, acceptable range 1197-1800)
Abdomen: _____ (target 948, acceptable range 698-1197)
Lead: _____ (target 530, acceptable range 382-698)

Density(16 ")
Lung: _____ (target 3730, acceptable range 3691-3767)
Heart: _____ (target 3250, acceptable range 3240-3260)
Mediastinum: _____ (target 1939, acceptable range 1589-2230)
Abdomen: _____ (target 1298, acceptable range 994-1589)
Lead: _____ (target 778, acceptable range 576-994)

Operator's name : .....
Date : .....
Measure instruments : .....

Troubleshooting
If the Heart is out of range

- Adjust the SID slightly until it is within range

If the other regions are out of range

- Check that the grid is in
- Check that the Spot Acquire LUT is set to "Linear WC" and not "Linear"
- Remove all filtration from collimator
- Check that there is no raw radiation at the edges of the phantom
- Check that the ND filter is in the out position
- Remeasure the system

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13.2.10. MTF (Spot)

This paragraph is applicable to digital systems only!

To access the Digital Service Application:
Right click on the image display portion of the User Application screen to bring up the options menu
Select Start Service Application.
The logon window will appear type "serviceapp" as user name and the proper password.

Purpose	People Required	Tools Required
To measure the overall resolution of the camera, optics, and image intensifier.	1 FE	Converging line pair resolution phantom [Nuc Assoc model 07-523]; 1.0 mm copper.

Estimated Duration	Pre-requisites	Safety issues
20 min	System calibrated	Radiation

Procedure

1) Set up the system with the following parameters:
   a) Phantom Location: pointy end upward on monitor, center the resolution desired (0.6 or 1.2 lp/mm) in the middle of the image
   b) SID: 115 cm
   c) SOD: place the line pair phantom on the tabletop
   d) Grid: out
   e) Additional Filter: 1.0 mm copper in collimator rails
   f) System: Digital Service Application
   g) Mode: Spot
   h) Technique: 70 kVp, 50 mA, phototimed AEC, density to 0
   i) II FOV (mag): 9"
   j) Focal Spot: small 0.6 mm
   k) Collimation: full open
   l) Edge: off
2) Enter Digital Service Application.
3) Select Calib menu > System Manual tab > Video Level tab > Acq LUT tab, and set the Spot Camera Mode Acquire LUT to Linear. Click Load LUT and Exit the Calib menu Saving changes.
4) Fluoro to center phantom into correct location.
5) Acquire a spot image.
6) Check that the image appears normal with no saturation.
7) Go to the IQA menu.
8) Go to the "ROI Density" tab.
9) Click "Run This Step."
10) Ensure the ROI Size selected is 64x64.
11) Click "Update Continuously."
12) Drag the ROI to a region of raw beam.
13) Record the Density below.
14) Verify the Density is within the acceptable range.

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15) Record the Post mSec for the exposure.
16) Go to the "Line Pair Resolution" tab.
17) Click "ROI Select" button to display ROI.
18) Center ROI with mouse over phantom (left/right) and at appropriate line pair resolution (up/down).
19) Click "Run This Step" and record result below.
20) Repeat for both resolutions (move phantom to maintain ROI in center of image).
21) Return spot Acquire LUT to default by selecting Calib menu > System Manual tab > Video Level tab > Acq LUT tab > Spot Camera Mode. Click Run and Exit the Calib menu Saving changes.

Results

Density in raw beam	_____	(acceptable range 525-725 for 16" or 714-986 for 12")
Post ms	_____	(LSL is 10 ms)
MTF% at 0.6 lp/mm	_____	(LSL is 58%)
MTF% at 1.2 lp/mm	_____	(LSL is 28%)

Operator's name : .....
Date : .....
Measure instruments : .....

Troubleshooting

If the Density is out of range

- Double check the Acq LUT was set to Linear and not Linear WC
- Repeat Spot calibration

If the MTF is below the LSL

- Check the camera optics focus calibration
- Check the II focus calibration
- Check that your focal spot selected is small
- Check that the grid is out

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13.2.11. Contrast Transfer and Dynamic Range (Fluoro)

This paragraph is applicable to analogical systems only!

Purpose	People Required	Tools Required
To verify contrast transfer, dynamic range, in fluoro mode	1 FE	GE cardiovascular (CV) phantom, 8" model

Estimated Duration	Pre-requisites	Safety issues
10 min	System calibrated	Radiation

Procedure

Set up the system with the following parameters:

a) Phantom Location: heart/lead facing upward on monitor;
b) SID: 115 cm;
c) SOD: place the C.V. phantom on the tabletop;
d) Grid: in;
e) Additional Filter: none;
f) Mode: Fluoro;
g) Technique: ABS ;
h) II FOV (mag): 9";
i) Focal Spot: small 0.6 mm;
j) Collimation: collimate tightly around phantom so that no raw radiation is showing.

Results

Density

Lung: _____ (target: visible)
Heart: _____ (target: visible)
Mediastinum: _____ (target: visible)
Abdomen: _____ (target: visible)
Lead: _____ (target: visible)

Compare the above-filed values with those specified in the specifications or obtained during the preceding constancy test.

Operator's name : .....
Date : .....
Measure instruments : .....

Troubleshooting

- Check that the grid is in
- Remove all filtration from collimator

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13.2.12. MTF (Fluoro)

This paragraph is applicable to analogical systems only!

Purpose	People Required	Tools Required
To measure the overall resolution of the camera, optics, and image intensifier.	1 FE	Converging line pair resolution phantom [Nuc Assoc model 07-523]

Estimated Duration	Pre-requisites	Safety issues
10 min	System calibrated	Radiation

Procedure

Set up the system with the following parameters:

a) Phantom Location: pointy end upward on monitor, center the phantom in the middle of the image;
b) SID: 115 cm;
c) SOD: place the line pair phantom on the tabletop;
d) Grid: out;
e) Additional Filter: No filter;
f) Mode: Fluoro;
g) Technique: ABS;
h) II FOV (mag): 9";
i) Focal Spot: small 0.6 mm;
j) Collimation: full open.

Results 1k x 1k camera:

Inchs	Resolution (lp/mm) measured value	Resolution (lp/mm) minimum acceptance limit
9"	……..	1,6

Results 512 x 512 camera:

Inchs	Resolution (lp/mm) measured value	Resolution (lp/mm) minimum acceptance limit
9"	……..	1,4

Compare the above-filed values with those specified in the specifications or obtained during the preceding constancy test.

Operator's name : .....
Date : .....
Measure instruments : .....

Troubleshooting

If the resolution is below the minimum acceptance

- Check the camera optics focus calibration;
- Check the II focus calibration;
- Check that the grid is out.

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13.3. Cleaning and disinfection instructions

Turn off the equipment and disconnect the electrical supply before starting any cleaning or disinfection operations.

In order to prevent any patient contamination and according the local regulation, after each procedure, always clean parts of the equipment, which were in contact with the patient (patient table, mattress, image intensifier) with a bactericidal, germicidal and antiviral solution. Check the solution used is also active against HIV virus and hepatitis B virus.

13.3.1. Cleaning

Clean the system by means of a soft cloth or a cotton rag. Dampen the cloth or rag with a solution of tepid water and liquid detergent of the type normally found in commerce.
Do not use any abrasive powder, nor organic solvents, neither liquid detergent containing solvents (petrol, alcohol, stain removers) which could damage the materials.
Equipment parts that enclose electrical components must not be immersed but rather cleaned with a soft dampened cloth, taking care not to allow liquids to enter the equipment.
Do not spray any liquid substance: the detergent fluid must not penetrate inside any equipment.

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13.3.1.1. Positioner

Patient contact surfaces should be washed with mild soap in lukewarm water. Surfaces should be scrubbed as needed using a soft sponge, gauze or cloth to remove all visible residues. Scrubbing with a soft bristle brush (such as a toothbrush) may be necessary to reach corners or to remove material that has dried onto the surface.
Subsequent disinfection may not be effective if the surfaces are not thoroughly clean. Rinse all surfaces with clean water to remove visible soap residue, taking care to avoid liquid entry to internal equipment parts. Dry surfaces with a soft cloth to remove any visible residues.

13.3.1.2. Generator

- Never use anything other than soap and water to clean plastic surfaces. Other cleaners may damage the plastic.
- Never use any corrosive, solvent or abrasive detergents or polishes.
- Ensure that no water or other liquid can enter any equipment. This precaution prevents short circuits and corrosion forming on components.
- Methods of disinfection used must conform to legal regulations and guidelines regarding disinfection and explosion protection.
- If disinfectants are used which form explosive mixtures of gases, these gases must have evaporated before switching on the equipment again.
- Disinfection by spraying is not recommended because the disinfectant may enter the X-ray equipment.
- If room disinfection is done with an atomizer, it is recommended that the equipment be switched OFF, allowed to cool down and covered with a plastic sheet. When the disinfectant mist has subsided, the plastic sheet may be removed and the equipment be disinfected by wiping.

13.3.1.3. PC Cabinet

Use a clean, soft cloth to wipe off any dirt or dust on the outside of the cabinet.

13.3.1.4. Monitor

External surfaces should be wiped to remove any foreign material that may have accumulated.
Painted surfaces should be cleaned using a clean cloth slightly moistened with a good mild cleaner and polish acceptable for such use.

13.3.1.5. Keyboard

Clean the keyboard by using compressed air contained in a can with a very long nozzle. Aim the air between the keys and blow away all the dust and debris that has gathered there. A vacuum cleaner can be used, but make sure the keyboard doesn't have "pop off" keys that could possibly be sucked up by the vacuum.

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13.3.1.6. Mouse

- Remove the bottom cover. Arrows on the cover indicate the direction in which the cover should be rotated.
- Place two fingers on the mouse cover and push in the direction of the arrows.
- Once the cover has rotated about an inch, rotate the mouse into its normal position covering the bottom of the mouse with one hand. The bottom should fall off and the mouse ball should be accessible.
- Once the bottom cover and the ball are removed, three rollers located within the mouse will be visible.
- Use your finger/fingernail to move the rollers in a horizontal direction. This action will loosen up any debris in the middle or the roller for removal.
- Once any dirt has been removed, place the ball back inside the mouse and replace cover.

13.3.1.7. Ceiling Stand

The unit does not require particular cleaning operations; however, pay attention not to damage it.
For painted parts do not use abrasive substances, but products like those for car body cleaning.

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13.3.2. Disinfection

For disinfecting the surfaces we recommend to use a liquid solution the aldehyde base type or disinfectants containing surface-active agents (such as Tego 103, Korsolin).
Other disinfectants containing chlorine or phenolic substances can etch the materials and we recommend not to use them.
These limitations are to be taken into account also for possible solutions containing a considerable part of chlorine.

Normally disinfectant sprays are not to be used: the sprayed liquid could penetrate inside the system affecting its safety characteristics and damaging the electrical components (possible formations of inflammable vapors or air).

WARNING:
It is known that disinfectant agents can be dangerous to the human health. Make sure the room is properly aired when using disinfectants and carefully follow the manufacturer's instructions concerning the use of the product.

13.4. Risks linked with the waste elimination

The following table gives all information applying to the material composing the equipment, as well as the relevant quantity and characteristics, so that at the end of its functioning life, it will be possible to provide for the disposal of the product to be carried out with minimized risks, according to the specifications established by the provisions of the law about waste elimination.

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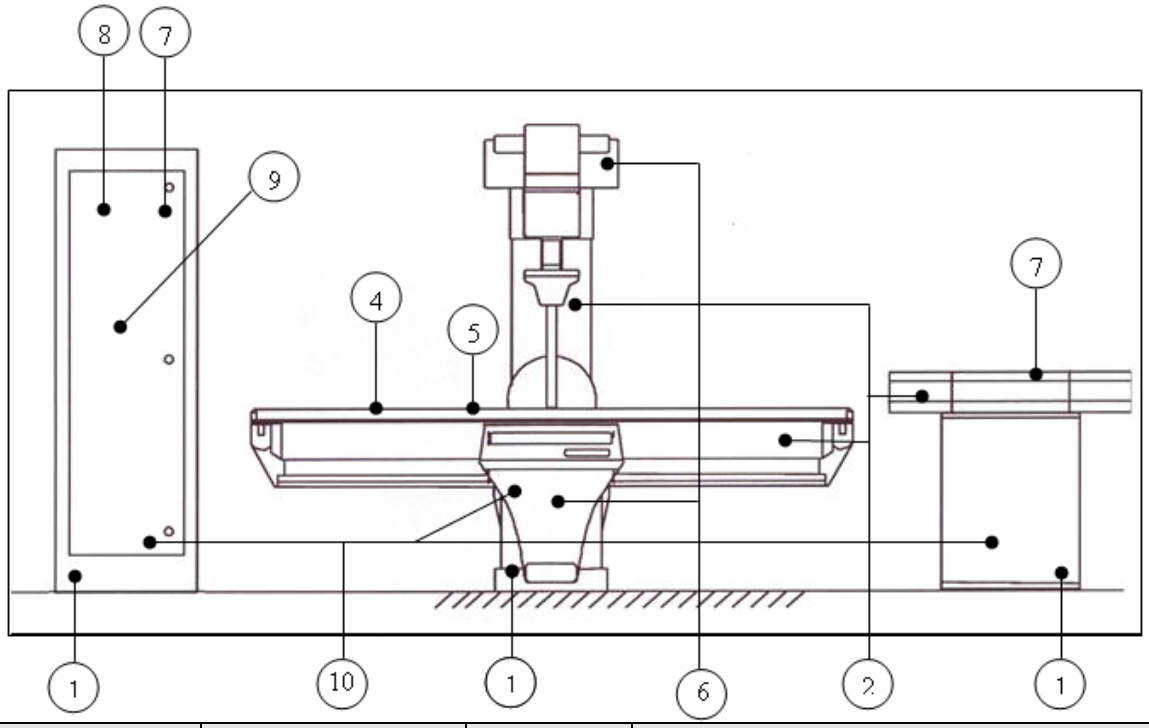
13.4.1. Positioner



Pos.	Component	Material	Quantity	Characteristics
1	General structure	Iron and its alloys	350 kg	Material that can be scrapped and recycled
		Aluminum	250 kg	Material that can be scrapped and recycled
3	Shielding	Lead	12 kg	Material that can be scrapped and recycled
4	Tabletop	Composite material including rohachel, carbon fiber and melaminic.	5.3 kg	Recovered material to be treated as Inert material that can be eliminated together with city solid refuse
5	Protections	Mylar	2 kg	Inert material that can be eliminated together with city solid refuse
6	Covers	ABS	7 kg	Recyclable material
7	Printed circuit	Epoxidic laminatic	>10 cm^2 5 kg	Inside the cabinet and control console recyclable material to be treated as WEEE
8	Battery	Lithium battery	1	Assembled on printed circuit microprocessor positioned on cabinet upper side recyclable material to be treated as WEEE
9	Rack motor gear	Electrolytic condenser	>25x25mm	Assembled inside the cabinet in the central side recyclable material to be treated as WEEE
10	Connection cables between table cabinet and console	Copper conductor + PvC insulting material	30 kg	Material that can be recycled but to be treated as special waste WEEE

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13.4.2. X-Ray housing

Pos.	Component	Material	Quantity	Characteristics
-	Housing	iron and its alloys lead mineral oil	21 kg	Material that can be scrapped and recycled
-	HV cables and electrical connections	copper and PVC insulating material	12 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste.

13.4.3. Generator

- HT tank: electrical insulating oil in HT tank. This is a mineral oil with trace additives. 25 liters.
- Solder (lead/tin).
- Epoxy fiberglass circuit board materials, tracks are solder on copper.
- Wire, tinned copper. Insulated with PVC, tefzel, or silicone.
- Steel and / or aluminum (generator cabinet and console chassis).
- Plastic (console enclosure and console membrane).
- Electrical and electronic components: IC's, transistors, diodes, resistors, capacitors, etc.

13.4.4. Wall Stand / OTS

The disassembly of the equipment must be done by authorized and qualified personnel.
The unit is quite totally made of metal materials, such as aluminum, steel and copper, and presents a minimum part of plastic material and electrical/electronic components.

- The metal parts can be recycled as scrap.
- The equipment contains some lead, which must not be dispersed in the environment.
- The electrical components and the plastic materials must be separately considered as special rubbish.

All materials used for the unit manufacture are not toxic or dangerous for the operators' health; that means they can be used without any particular precaution. In any case the disassembly/recycling of the equipment materials must be done according to rules which are in force at the moment of the operation. The equipment supplier is at full disposal for any kind of information.

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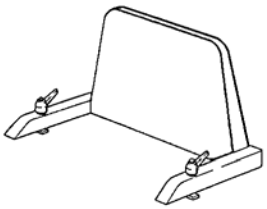
14. Accessories

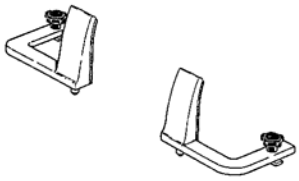
The universality of the table is further enhanced by the availability of a wide range of accessories.

NOTE:
The accessories used must be the original ones by GE

14.1. Standard accessories



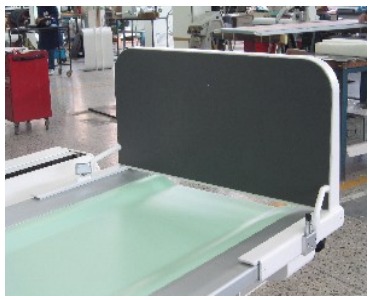
adjustable
height footrest



shoulder rest

hand grips

Adjustable-height footrest
Shoulder-rests
Handgrips

 Foot rest	Shoulder-rests	Handgrips

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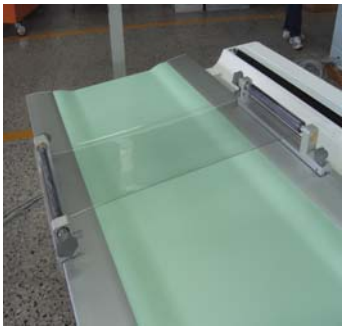
14.2. Optional accessories

- Compression belt
- Ankle-support
- Leg-support
- Lateral cassette-support
- Head-contention device
- Support for glass of barium
- Adapter for cassette 15x40
- Adapter for cassette 13x18
- Intercommunication system,
- Photocell for low ceilings
- Double R/f remote foot pedal
- On board console joystick
- Patient step
- Leg-support


Compression belt

Ankle - support

Lateral cassette-support

Head-contention device

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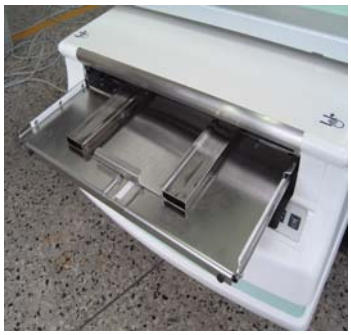


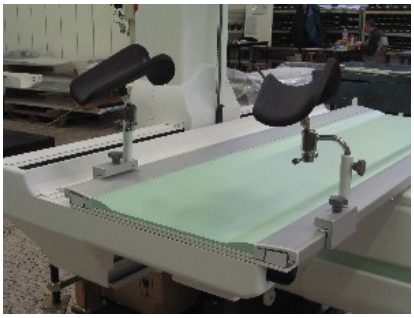
Adapter for cassette 15x40
Adapter for cassette 13x18

Intercommunication system

Double R/F remote foot pedal

On board console joystick

Patient step



Leg-support

Support for glass of barium

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14.3. Using the accessories

Please find in the next pages important information applying to the use of the standard accessories. In order to ensure the product reliability only accessories supplied with the Precision RXi should be used. The user is held responsible for the use of other possible accessories that are not authorized by GE.

14.3.1. Handgrips

The hand-grips ensure the patient a safe and firm position as well as an increased sensation of safety.
The hand-grips can be fixed in any position of the plan's guides.
The following procedure is to be carried out for fixing them:

1. Place the table in the horizontal position;
2. Loosen the knob of the hand-grip as much as it is necessary, by turning it counterclockwise;
3. Insert the hand-grip support on the patient-holder guide;
4. Place the hand-grip in the requested position;
5. Fix the hand-grip by turning the knob thoroughly clockwise.

14.3.2. Patient-support footrest

When examinations are to be executed with the table in the vertical position, the patient-support footrest can be used as a base support to keep the patient in the standing position or make him sit down.
The footrest can be mounted either on the right end (normally the foot-side) or the left end (normally the head-side) of the tabletop.
The following procedure is to be carried out for mounting it:

1. Place the table in the horizontal position;
2. Hold the footrest so that its slides are perfectly aligned with the guides of the tabletop.
3. Insert the footrest in the guides paying attention not to scratch the guides of the tabletop;
4. Allow the footrest to slide by keeping the clamping push-buttons pressed until the footrest is almost completely inserted in the guides.
5. Release the clamping push-buttons and slide the footrest until you can hear the click of the locking device of the footrest itself;
6. Make sure that the footrest is firmly secured to the guides by bearing down and pressing on the longitudinal direction onwards and backwards;
7. The footrest can also be fixed in a more advanced position compared with the center of the tabletop: it will be sufficient to press the clamping push-buttons so as to release the locking pawls;
8. Push the footrest some centimeters onwards and release the clamping push-buttons; keep on pushing the footrest slowly onwards until the new position is reached and fix the footrest;
9. Make sure that it is firmly secured to the guides by bearing down on the longitudinal axis onwards and backwards;
10. If you want to remove the footrest it will be sufficient to:
11. press the clamping push-buttons so as to release the locking pawls;

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12. pull the footrest to draw it out from the guides (in the opposite direction compared to the center of the table) by keeping the clamping push-buttons pressed at least until they are beyond the external edge of the guides of the tabletop.

WARNING:
Do not execute any adjustment of the footrest when the table is in the vertical position: you would take the risk to make the patient fall or hurt your feet.

14.3.3. Shoulder-rests

The shoulder-rests ensure complete safety to the patient when, during the examination, it is necessary to place him in the trendelenburg position (e.g. myelography).
Place the table in the horizontal position.
The shoulder-rests must be mounted one at a time.
Since it is possible to use the shoulder-rests together with the hand-grips, before mounting the shoulder-rests it will be necessary to fix the had-grips (when these are not already mounted on the guides):

1. Place the table in the horizontal position
2. Loosen the clamping knobs of the shoulder-rest and insert it on the guide of the tabletop, paying attention not to scratch it.
3. Place the shoulder rest in the desired position and fix it by turning the clamping knob clockwise.

Repeat the same above-mentioned procedure to mount the other shoulder-rest.

14.3.4. Compression belt

This accessory is normally used for compressing possible layers of tissue during the execution of abdominal examinations in order to reduce the volume of the irradiated masses and thus reducing the quantity of radiation scattering; the compression belt is also used to secure possible unsteady or sensitive patients and protect them from accidental falls.
It consists of two mechanical parts ensuring the tension and one belt made of fabric that can be easily removed to be periodically washed and sterilized.
By means of the knobs it is possible to measure out the requested tension for any specific needs.
Fixing the compression belt:

1. Place the table in the horizontal position.
2. insert one of the two mechanical supports in the guides of the tabletop, paying attention not to scratch the guides themselves; turn the locking knob clockwise in order to fix the support onto the guide in the requested position.
3. Insert the other mechanical support in the opposite guide so as to have it in a symmetric position compared with the support previously inserted; pay your best attention while fixing it in the wanted position.

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Application of the fabric belt:

1. Each end of the fabric belt is provided with a pocket for inserting a rigid rod.
2. Raise the pawl ensuring the holding of the compression belt so that this one is set free to unwind and insert the little rod inside the free extremity of the belt; make this extremity pass under the bar of the opposite belt tightener.
3. Insert the extremity of the belt containing the rigid rod inside the cleft of the winding wheel.
4. Turn the knob of the winding wheel at least one turn clockwise.
5. Lower the pawl provided for holding the mechanical support from which the belt was unwound so as to stop its unwinding.
6. In order to properly stretch the belt, the knob of the belt tightener placed towards the free external side of the tabletop must be turned clockwise.

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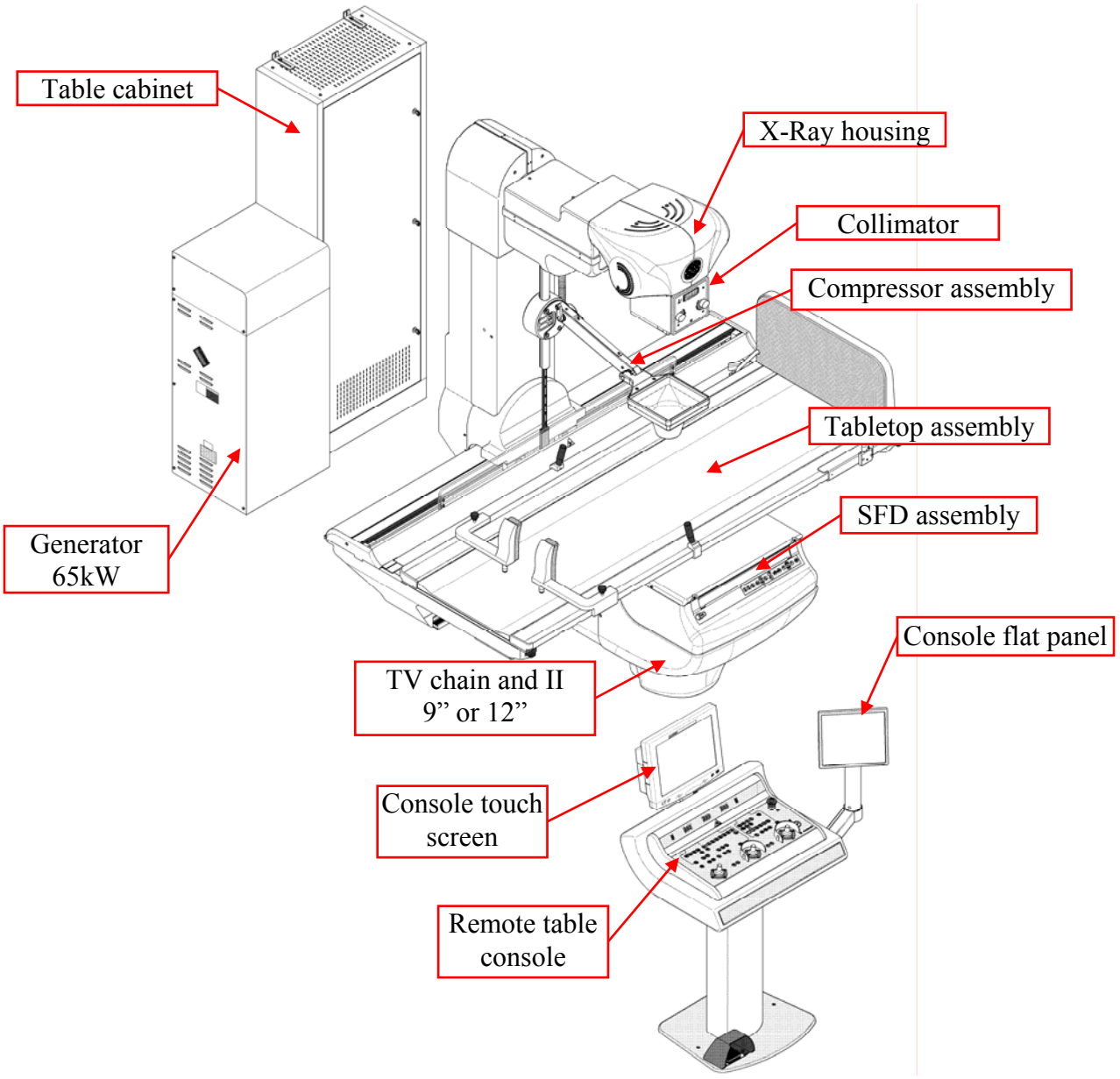
15. Precision RXi 512x512 analog TV chain

The following chapter describes the Precision RXi 512x512 pixel TV chain analogical version.
As a result the next pages are going to interest only operators that have chosen the Precision RXi TV chain analogical version.

15.1. Introduction

The Analog Tv chain 512 identify a "radiological system" consisting in: a high-resolution camera, Monitor and I. I. The Analog TV chain 512 radiological system's aim is to acquire images through the X ray digital fluoroscopy.



A typical room configuration

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The main system characteristics are the following:

- Positioner with Image intensifier 9” or Image intensifier 12”
- Generator 65 kW with touch screen
- TV chain (Last Image Hold) with recursive filter
- Memorization of one image at the release of the foot switch fluoroscopy
- B&W Monitor, LCD 17”
- Optional: Additional Monitor LCD 17”

	Image Intensifier	TV camera	Noise reduction filter	Monitor
512 - 9”	9 "(23 cm)"	324 k progressive	Recursive filter	17” “LCD” 1280 lines/50 Hz
512 – 12”	12 "(32 cm)"	324 k progressive	Recursive filter	17” “LCD” 1280 lines/50 Hz

15.2. TV chain data and characteristics

Power supply
Camera power supply: 24Vdc ± 20%
Electrical input: 20W

Insulation class:
First class
With applicable parts: no one

For monitors power supply make reference to monitors manual

Power supply must be in compliance with the requirements established by Medical Equipment Directive 93/42 CEE

15.2.1. Environmental characteristics and functioning limits

HUMIDITY				TEMPERATURE				ALTITUDE			
In use		In stock		In use		In stock		In use		In stock	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
30%	75%	10%	90%	10°C	40°C	-20°C	70°C	700 hPa	1060 hPa	700 hPa	1060 hPa

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15.3. System performances

15.3.1. Image Intensifiers

The 9" (23 cm) image intensifier is an HP2 type and the 12" (32 cm) image intensifier is an QX type. They are especially suitable for general diagnostic examinations with TV fluoroscopy.

Specific attention was placed on the magnetic shielding for S distortion correction. Besides, for the 12" intensifier, is available as option the ADCS (Active Distortion Correction System) module that allows a real-time correction of a residual S distortion not removable as variable with table tilting.

15.3.2. 512 Analog TV chain

High performance solution with LCD monitor, 9" or 12” intensifiers, CCD camera with a CCD sensor of 752 x 582 pixels.

15.3.3. TV monitor characteristics

Technical data	
Type	Monitor LCD
Manufacturer	NICAL
Model	NLRB17AAA
Hardware requirements	
Mounting interface	VESA compatible 75x75mm and 100x100 mm centered mounting pad
Power supply location	Internal power supply
Video connector	Double BNC video connector
Brightness and contrast controls	Dedicated knob or remote regulation
Case color	Black grey RAL 9002
Frame color	Anthracite RAL 7016
Dimensions and weight	**Monitor 17”**
Weight	4 Kg
Height	302 mm
Depth	60 mm
Width	367 mm
Screen dimensions	17” (43 cm)
Electrical characteristics for all models	
Standard power supply	115/230 Vac ±15%
Frequency	50-60 Hz
Current absorbed	250mA @ 230Vac; 450mA @ 115Vac
Power absorbed	50 W

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Display characteristic	Monitor 17”
Visibility angle	180°
Contrast	1000:1
Resolution	1280x1024
Pixel pitch	0,264x0,264 mm
Gray scale	768 levels
Max luminance	350 Cd/m^2
Calibration	automatic
Aspect ratio	4:3
Response time	Total response time less than 25 ms
A/D Sampling	10 bit
Screen surface	Anti veiling glare/reflection with no speckle noise
Calibration	Automatic
Storage memory	Last image hold input connection
Video input	2 BNC connectors 75 Ohm
Video signal	1Vpp negative sync.
Video standard	CCIR 625/50Hz EIA 525/60

15.3.4. Camera characteristics

	512 Analog TV chain
image matrix	752 x 582
scanning system	Interline
aspect ratio	4:3
integrated high resolution optical system	yes
gamma correction	0,4 or 1
bandwidth	20 MHz+/-3dB
recursive filter	With factors 2, 4, 8, 16
automatic video level compensation	yes
dynamic contrast compensation (shading)	yes
electronic circle	yes
video output signal	1 Vpp

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15.3.5. Dose Control Device

The system is completed of an automatic device for fluoroscopy dose control with kV/mA variation.

15.3.6. Monitor Support - optional

Types of TV monitor supports available:

- ceiling suspension.
- Monitor chart.

15.3.6.1. Ceiling suspension optional

Ceiling suspension is the more efficient and rational solution when maximum patient accessibility and great TV monitor displacement are required. It can sustain one or two monitors and can be installed fix or on translation rails.

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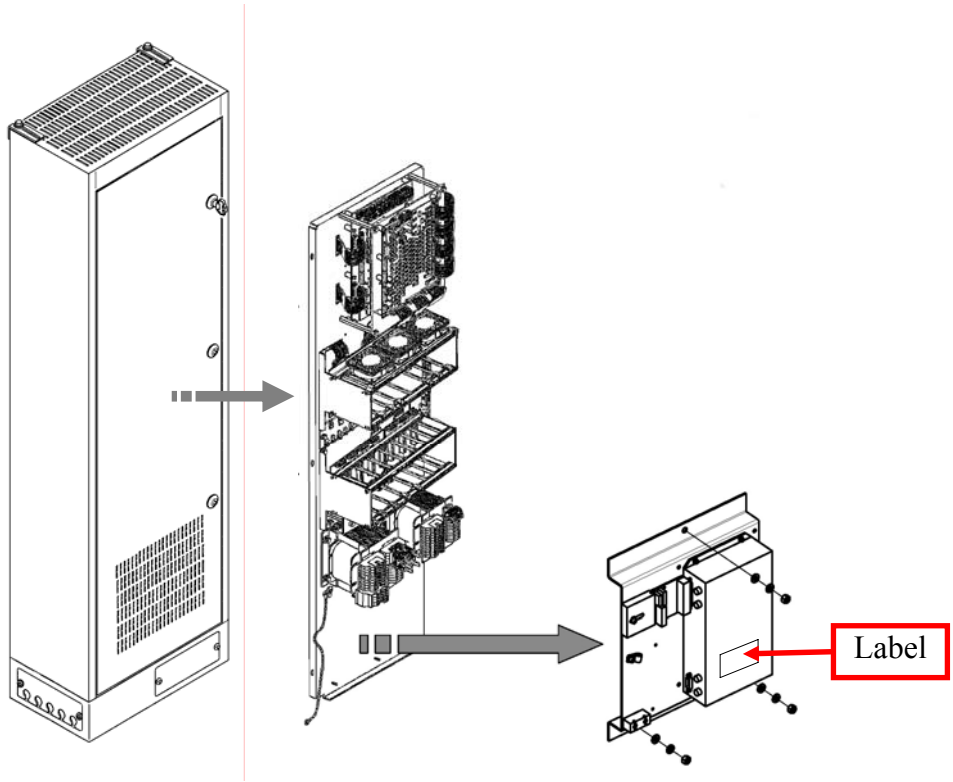
15.4. Identification labels



The gear case assembly with board and camera are identified by the following labels:

For the remaining system components make reference to section 03 "System overview" par. 3.3

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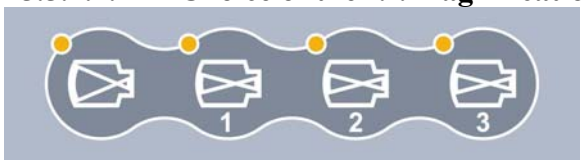
15.5. User interface

15.5.1. Consoles and user interfacings

See section 03 "System overview" par. 3.2

15.5.1.1. Choice of the I.I. magnification factors



1 2 3 4

By means of these push-buttons (1, 2, 3 and 4) the operator can select the most adequate I.I. field.
With a 9" I.I., the magnification fields available are only 3, from 0 to 2.

15.5.1.2. Receptor selection

13 14

receptors (touch screen)

The push-button **14** is disabled with this analogical version of the system.
The equipment does not allow digital radiography.
The push-button **13** allows the acquisition of the images on the film or in fluoroscopy mode (SFD).
To change receptor, use the appropriate receptor button on the touch screen. For example this allows the user to toggle from SFD mode or direct tabletop (see section 4 "Getting Started").

15.5.1.3. Acquisition frequency / review or image memorization functions

22 33

These push-buttons (**22** and **33**) have no function for this version of equipment.

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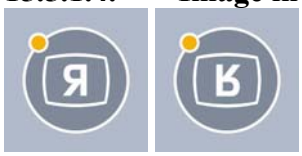
15.5.1.4. Image inversion on the monitor



34 **35**

By means of these push-buttons **(34** and **35)** it is possible to select image inversion:

- Right-to-left image inversion (34)
- Up-to-down image inversion (35)

15.5.2. Switching on the system

NOTE: *DO NOT use the generator during the power-up cycle.*

1 Switch ON the power for the positioner (see section 04 “Getting started” par. 4.1.2).
2 Switch ON the power for the x-ray generator (see section 04 “Getting started” par. 4.1.1).
3 Switch ON the power for each of the system’s Image Monitors and other peripherals.

15.5.3. Switching off the system

1 Switch OFF the power for each of the system’s Image Monitors and other peripherals.
2 Switch OFF the power for the x-ray generator (see section 04 “Getting started” par. 4.2.3).
3 Switch OFF the power for the positioner (see section 04 “Getting started” par. 4.3.4).

15.5.4. Warm up procedure

CAUTION *The following procedure produces x-rays. observe all safety precautions to protect personnel.*

See section 04 “Getting started” par. 4.3.

15.5.5. Positioner mechanical movements

See section 04 “Getting started” par. 4.4.

15.5.6. Generator Console display and operation

See section 04 “Getting started” par. 4.5.

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15.5.7. Error codes

See section 12 “Error codes”

15.6. Maintenance and cleaning

See also section 13 “Maintenance”

15.6.1. Maintenance

The system will serve you well if you take care of it.

- Do not expose the system to direct sunlight. Do not place near sources of heat, such as a radiator.
- Do not expose the system to temperature do not mention in the service manual.
- Do not subject the system to magnetic fields.
- Do not expose the system to rain or moisture.
- Do not spill water or any liquid on the system.
- Do not subject the system to heavy shock and vibration.
- Do not expose the device to dust and dirt.
- Never place objects on top of the system to avoid damaging it.
- Never place the system on uneven surfaces.

All electrical equipment should be used according to the instruction provided. It is advised to control all connections and the image quality on a regular basis. Is will guarantee an efficient function and long product life.

15.6.2. Maintenance guide

Frequency	Description
2 years	Cable connection and condition inspection
6 months	Image quality check

15.6.3. Cleaning

When cleaning the system, follow these steps:

- Power off the system.
- Use a soft cloth moistened with water.
- Do not use liquid or solvents.

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15.7. Risks linked with the waste elimination

The following table gives all information applying to the material composing the equipment, as well as the relevant quantity and characteristics, so that at the end of its functioning life, it will be possible to provide for the disposal of the product to be carried out with minimized risks, according to the specifications established by the provisions of the law about waste elimination.

COMPONENT	MATERIAL	QUANTITY	CHARACTERISTICS
trolley	iron and its alloys	55 kg	material that can be scrapped and recycled
	plastic material	5 kg	material that can be scrapped and recycled
I.I. tube	iron and its alloys lead mineral oil	40 kg	material that can be scrapped and recycled
cables and electrical connections	copper and pvc insulating material	15 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste
electronic boards	Pcb. passive and active electronic	2 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste
monitor	plastic material	18 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste

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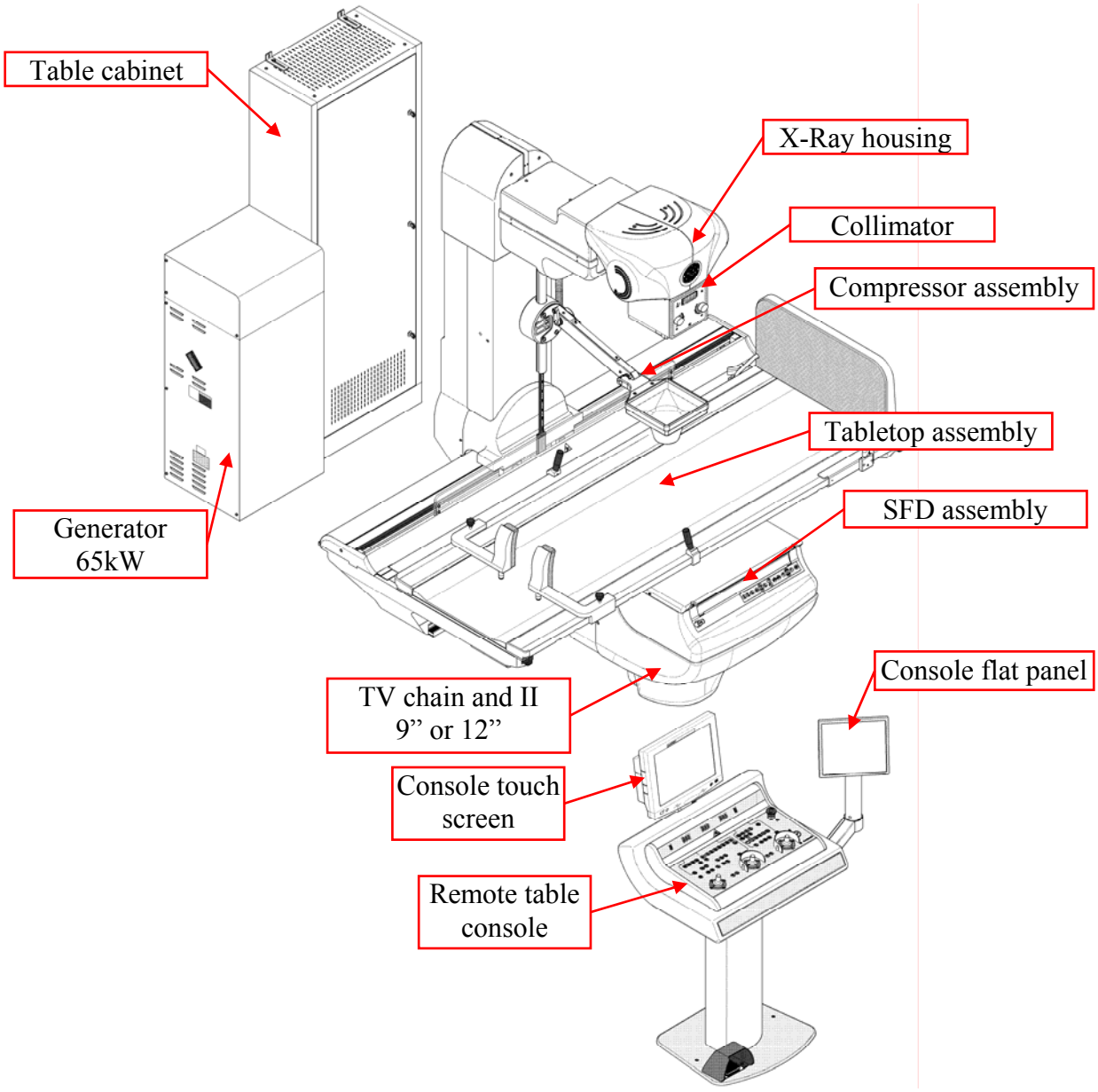
16. Precision RXi system pulsed fluoro 1k TV chain analog version

The following chapter describes the Precision RXi 1k x 1k pixels TV chain analogical version with pulsed fluoroscopy. As a result the next pages are going to interest only operators that have chosen the Precision RXi TV chain analogical version.

16.1. Introduction

The Analog TV chain 1K consists of a high-resolution camera, Monitor and I.I. The Analog TV chain 1k radiological system aim is to acquire images through the X ray digital fluoroscopy.



A typical room configuration

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The main system characteristics are the following:

- Positioner with Image intensifier 9” or Image intensifier 12”
- Generator 65 kW with touch screen
- 1024x1024 TV chain (Last Image Hold) with dynamic recursive filter
- Memorization of one image at the release of the foot switch fluoroscopy
- Possibility to memorize 99 images in cine loop
- Pulsed fluoroscopy 1, 3, 6 and 12 frame / second
- Reviewing images at variable speed 25 -12 - 6 - 3 -1 image / second
- B&W Monitor, LCD 19”
- Optional: Additional Monitor

	Image Intensifier	TV camera	Noise reduction filter	Monitor
1k x 1k - 9”	9 "(23 cm)"	1024x1024 progressive	DRF	19” “LCD” 1280 lines/60 Hz
1k x 1k - 12”	12 "(32 cm)"	1024x1024 progressive	DRF	19” “LCD” 1280 lines/60 Hz

16.2. TV chain data and characteristics

Power supply
Camera power supply: 24Vdc ± 20%
Electrical input: 30W

Insulation class:
First class
With applicable parts: no one

For monitors power supply make reference to monitors manual

Power supply must be in compliance with the requirements established by Medical Equipment Directive 93/42 CEE

16.2.1. Environmental characteristics and functioning limits

HUMIDITY				TEMPERATURE				ALTITUDE			
In use		In stock		In use		In stock		In use		In stock	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
30%	75%	10%	95%	10°C	40°C	-10°C	60°C	700 hPa	1060 hPa	500 hPa	1060 hPa

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16.3. System performances

16.3.1. Image Intensifiers

The 9" (23 cm) image intensifier is an HP2 type and the 12" (32 cm) image intensifier is an QX type. They are especially suitable for general diagnostic examinations with TV fluoroscopy.

Specific attention was placed on the magnetic shielding for S distortion correction. Besides, for the 12" intensifier, is available as option the ADCS (Active Distortion Correction System) module that allows a real-time correction of a residual S distortion not removable as variable with table tilting.

16.3.2. 1024 Analog TV chain

High performance solution thanks a LCD monitor and the adoption of the Dynamic Recursive Filter (DRF).
It is proposed with 9" and 12" intensifiers, CCD camera with a CCD sensor of 1024x1024 pixels.

16.3.3. Dynamic Recursive Filter (DRF)

DRF is a particular and innovative recursive filter capable to modify the filter factor dynamically pixel for pixel which, as well allowing an effective reduction of the noise, removes the persistence phenomena due to fast movements in the image.

16.3.4. TV monitor characteristics

	1k Analog Tv chain
technology	LCD
dimensions	19" (48 centimeters)
lines	1280 X 1024
frequency	50 / 60 Hz

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16.3.5. Camera characteristics

Available CCD scanning system :	1024 x 1024 pixels
Scanning aspect ratio:	1:1 Progressive scanning
CCD Camera Head :	
Integrated optical lens system:	High resolution with adjustable focus and diaphragms
Image intensifier output screen:	From 15 to 40 mm diameter.
Mounting frames:	From 6” inch to 16” inch I.I.
CCD / CCU Characteristics :	
Gamma correction:	0.35 (for better performance)
Video output A/D converter:	12 bits
Video Bandwidth:	40 MHz ± 3dB
DRF (Dynamic Recursive Filter):	Yes
Standard Recursive filter:	Factor 2,4,8,16
Memory:	16 bits
Automatic video level compensation:	Yes
Automatic x-ray kV/mA compensation:	Yes. Analog and digital (up/down)
Dynamic contrast compensation for better image uniformity:	Yes (shading)
Very high dynamic video amplifier:	Yes
High precision electronic circle:	Yes
Video output signal:	1 Vpp (0.3 Vpp Sync)
Video output standards :	two channels 1049/60 Hz
Operating conditions :	
Working temperature range:	-10°C to +45°C
Store temperature range:	-40°C to +55°C
Humidity:	Operating to 95% relative humidity (non-condensing)
Mechanical specifications :	
Control unit: dimension (WxDxH)/ Weight:	235x192x65mm 1500gr
Camera head: dimension (ϕ x H)/Weight:	(Standard) 127x108mm 1400gr (with Rotation) 125x 95mm 1400gr
Available power supply :	24Vdc ± 20%
Approvals :	
Safety:	EN 60601-1
EMC:	EN 60601-1-2
Others:	CE-label according 93/42 CEE directive for medical devices.
Options :	360° Continuous rotating camera head (with slip ring) Neutral density filter

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16.3.6. Dose Control Device

The system is completed of an automatic device for fluoroscopy dose control with kV/mA variation.

16.3.7. Monitor Support -optional

Types of TV monitor supports available:

- ceiling suspension.
- monitor chart.

16.3.7.1. Ceiling suspension optional

Ceiling suspension is the more efficient and rational solution when maximum patient accessibility and great TV monitor displacement are required. It can sustain one or two monitors and can be installed fix or on translation rails.

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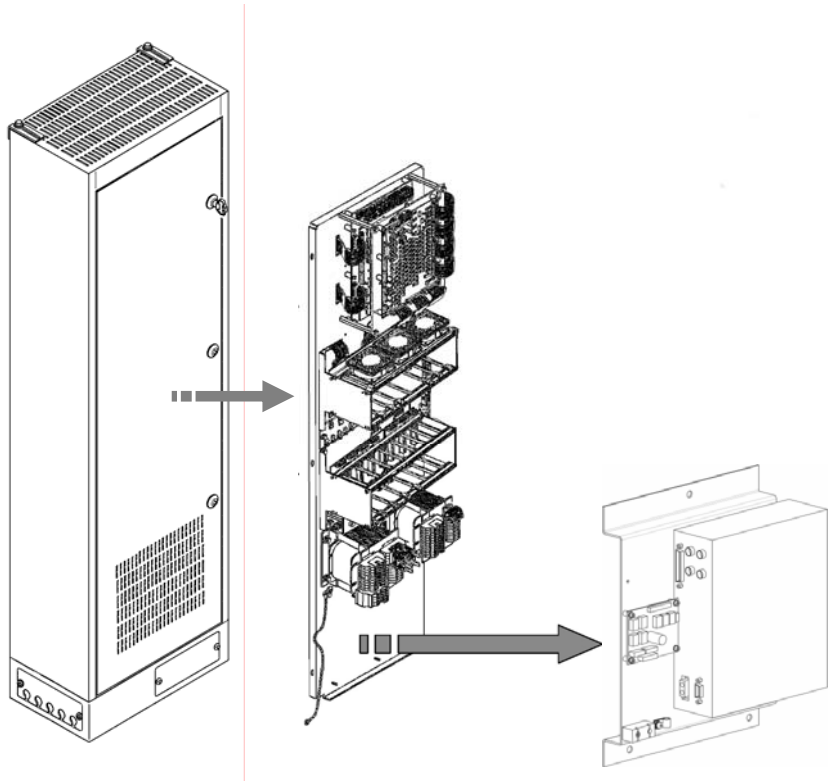
16.4. Identification labels



The gear case assembly with board and camera are identified by the following labels:

For the remaining system components make reference to section 03 "System overview" par. 3.3

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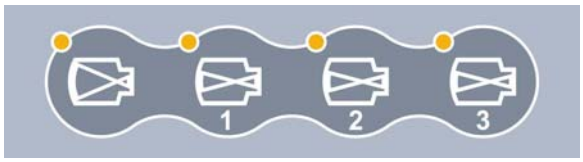
16.5. User interface

See section 03 "System overview" par. 3.2

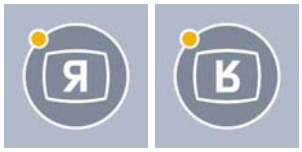
16.5.1. Choice of the I.I. magnification factors



1 2 3 4

By means of these push-buttons (1, 2, 3 and 4) on the positioner console, the operator can select the most adequate I.I. field. Remember that with a 9" I.I., the magnification fields available are only 3, from 0 to 2 (the field n.3 is not available).

16.5.2. Image inversion on the monitor



34 35

By means of these push-buttons **(34** and **35)** it is possible to select image inversion:

- Right-to-left image inversion (**34**)
- Up-to-down image inversion (**35**)

16.5.3. Receptor selection

13 14

receptors (touch screen)

The push-button **14** is disabled with this analogical version of the system.
The equipment does not allow digital radiography.
The push-button **13** allows the acquisition of the images on the film or in fluoroscopy mode (SFD).
To change receptor, use the appropriate receptor button on the touch screen. For example this allows the user to toggle from SFD mode or direct tabletop (see section 4 "Getting Started").

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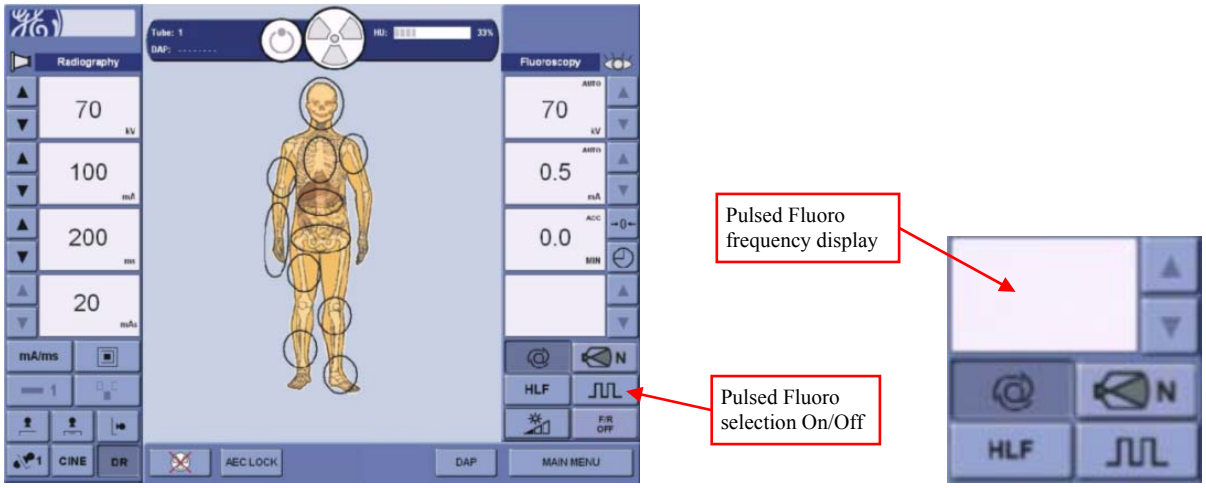
16.5.4. Continuous or pulsed fluoroscopy modality



To select continuous or pulsed fluoroscopy modality, toggle the button on the touch screen.
See section 4, par. 4.5.3.5 “Fluoroscopy controls and display” for more details.

16.5.4.1. Continuous fluoroscopy

With this modality the generator produce a continuous X-Ray beam.
The user can see live images on the screen and the Last Image Hold function is present.

The TV chain 1k*1k has also the opportunity to memorize and visualize on the monitor **99 images** in cineloop modality. The images memorization speed can be changed among 12, 6, 3, 1, image/s using the button 33. The beginning of the memorization can be defined pressing the button (22).

33 **22**

The console display n.1 visualizes the number shown in the following column table (*), that correspond to the values shown in each column table line (see following table):

Number visualized on the console (*)	Img/s	Maximum time
0	NOT - AVAILABLE	
1	12	8 sec
2	6	17 sec
3	3	33 sec
4	1	99 sec

Images memorization speed during continuous fluoroscopy

To determine the images acquisition maximum time make reference to the previous table.

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To memorize images, push the foot fluoroscopy pedal to activate X-Ray beam and press the button **(22)** on table console when the properly images are present on the screen.
The memorization of the images will take place till the button (22) on table console is pressed.

The images memorization will stop in one of these cases:
1) releasing the fluoroscopy foot pedal;
2) releasing the button (22) on table console, it should be possible to store multiple fluoro sequence;
3) at the 99th image

16.5.4.2. Pulsed fluoroscopy

With this modality the generator produce a pulsed X-Ray beam. The pulses frequency is defined by the touch panel buttons.
The user can see live images on the screen and the Last Image Hold function is present.
The TV chain 1k*1k has also the opportunity to memorize and visualize on the monitor **99 images** in cineloop modality. The images memorization speed is the same defined by means of the touch panel.

Generator touch screen pulse/s	Img/s	Maximum time
12	12	8 sec
6	6	17 sec
3	3	33 sec
1	1	99 sec

Generator pulses and images memorization speed during pulsed fluoroscopy

22

To determine the images acquisition maximum time make reference to the previous table.

To memorize images, push the foot fluoroscopy pedal to activate Xray beam and press the button **(22)** on table console when the properly images are present on the screen.
The memorization of the images will take place till the button **(22)** on table console is pressed.

The images memorization will stop in one of these cases:
1) releasing the fluoroscopy foot pedal;
2) releasing the button (22) on table console;
3) at the 99th image.

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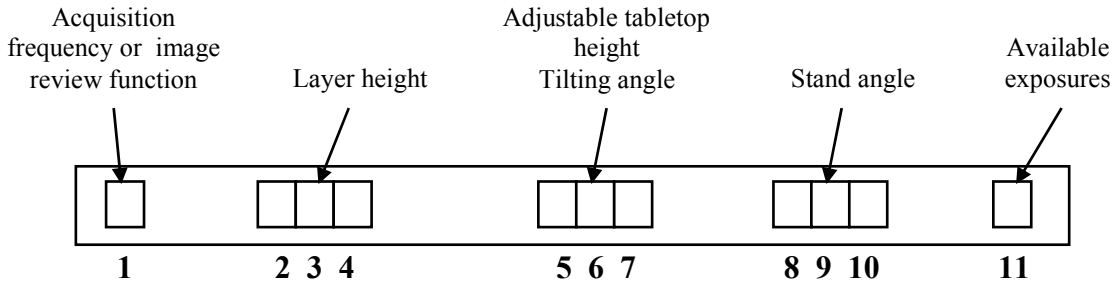
16.5.5. Cine loop function (review speed)



Is possible to review the images with different speeds using the following push-buttons on the table control panel console:

33

22

The console display n.1 visualizes the number shown in the following table, column (*).

Number visualized on the console (*)	Img/s	Maximum time
0	**IMAGES DELETING**	
1	12	8 sec
2	6	17 sec
3	3	33 sec
4	1	99 sec

Images visualization speed during fluoroscopy review

To visualize the images memorized you must push the button **(22)** on table console.
The visualization of the images will take place till the button **(22)** on table console is pressed.
It is possible to change the images visualization speed by pushing button **(33).**

The images visualization will be stopped in one of these cases:
1) pressing the fluoroscopy foot pedal;
2) releasing the button **(22)** on table console;

To delete stored images make reference to the following procedure:
1) Do select on Table console display 0.
2) Press for at least 3 seconds the push button (22) on the table console.
Thanks to the above procedure all the stored images will be deleted.

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16.5.6. Switching on the system

NOTE: *DO NOT use the generator during the power-up cycle.*

1 Switch ON the power for the positioner (see section 04 “Getting started” par. 4.1.2).
2 Switch ON the power for the x-ray generator (see section 04 “Getting started” par. 4.1.1).
3 Switch ON the power for each of the system’s Image Monitors and other peripherals.

16.5.7. Switching off the system

1 Switch OFF the power for each of the system’s Image Monitors and other peripherals.
2 Switch OFF the power for the x-ray generator (see section 04 “Getting started” par. 4.2.3).
3 Switch OFF the power for the positioner (see section 04 “Getting started” par. 4.3.4).

16.5.8. Warm up procedure

CAUTION
The following procedure produces x-rays. observe all safety precautions to protect personnel.

See section 04 “Getting started” par. 4.3.

16.5.9. Positioner mechanical movements

See section 04 “Getting started” par. 4.4.

16.5.10. Generator Console display and operation

See also section 04 “Getting started” par. 4.5.

16.5.11. Error codes

See section 12 “Error codes”

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16.6. Maintenance and cleaning

See also section 13 “Maintenance”

16.6.1. Maintenance

The system will serve you well if you take care of it.

- Do not expose the system to direct sunlight. Do not place near sources of heat, such as a radiator.
- Do not expose the system to temperature do not mention in the service manual.
- Do not subject the system to magnetic fields.
- Do not expose the system to rain or moisture.
- Do not spill water or any liquid on the system.
- Do not subject the system to heavy shock and vibration.
- Do not expose the device to dust and dirt.
- Never place objects on top of the system to avoid damaging it.
- Never place the system on uneven surfaces.

All electrical equipment should be used according to the instruction provided. It is advised to control all connections and the image quality on a regular basis. Is will guarantee an efficient function and long product life.

16.6.2. Maintenance guide

Frequency	Description
2 years	Cable connection and condition inspection
6 months	Image quality check

16.6.3. Cleaning

When cleaning the system, follow these steps:

- Power off the system.
- Use a soft cloth moistened with water.
- Do not use liquid or solvents.

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16.7. Risks linked with the waste elimination

The following table gives all information applying to the material composing the equipment, as well as the relevant quantity and characteristics, so that at the end of its functioning life, it will be possible to provide for the disposal of the product to be carried out with minimized risks, according to the specifications established by the provisions of the law about waste elimination.

COMPONENT	MATERIAL	QUANTITY	CHARACTERISTICS
trolley	iron and its alloys	55 kg	material that can be scrapped and recycled
	plastic material	5 kg	material that can be scrapped and recycled
I.I. tube	iron and its alloys lead mineral oil	40 kg	material that can be scrapped and recycled
cables and electrical connections	copper and pvc insulating material	15 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste
electronic boards	Pcb. passive and active electronic	2 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste
monitor	plastic material	18 kg	material that can be scrapped and recycled must be managed as a special non dangerous waste

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17. Appendix

17.1. Abbreviations/Definitions

What follows is a list of commonly used abbreviations and terms used in the manual.

A	ampere
ABS	Automatic Brightness Stabilization
AC	Alternating Current
ACR-NEMA	American College of Radiology – National Electronics Manufacturers Association
AGC	Automatic Gain Control
AIO	Auto Image Optimization – A technique used to automatically select the optimum W/L and Display Lookup Table before the image is displayed.
ATA66	66 Mbyte/Sec IDE Interface
BGHC	Background Hardcopy.
Bit	Smallest quantity of computer data represented by either 0 or 1
Byte	8-bit quantity
°C	degree Celsius
CD-RW	Compact Disk-Rewritable
cm	centimeters
Control Room	Room separate from the In-Room where the patient can be monitored during the procedure.
CPU	Central Processing Unit.
DAC	Digital to Analog Converter
DICOM	Digital Imaging Communications in Medicine.
DHC	Digital Host Control Interface Board
DRAM	Dynamic RAM
DSA	Digital Subtraction Angiography (also known as Vascular Procedure)
DSP	Digital Signal Processor
E	Expose
°F	degree Fahrenheit
FDA	Food and Drug Administration
FIFO	First In First Out
FOV	Field Of View
FPGA	Field Programmable Gate Array
fps	Frames per second
FRU	Field Replaceable Unit

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FWD	Forward
Gx	Gain – Refers to Image Intensifier gain
hPa	hecto Pascal (unit of pressure measurement)
HDD	Hard Disk Drive
Hz	hertz
IAPDB	Image Acquisition Processing and Display Board
In-Room	The room that contains the x-ray source, detector and the table that holds the patient undergoing the procedure
kV	kilovolt
L	Level (Brightness)
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LIH	Last Image Hold
LUT	Lookup Table.
LVO	Live Video Override (aka Fluoro Override)
Mbytes	1024^2 or 1,048,576 bytes
MC	Motion Correction
mA	milliampere
MID	Multi Image Display
mm	millimeter
mR	milli-rad
OTS	Off The Shelf
OTS	Overhead Tube Suspension
Opacification	*An act or the process of becoming or rendering opaque
PACE	Post-acquisition Automatic Copy and Enhancement.
PC	Personal Computer.
PCI	Peripheral Component Interconnect.
PCI Processor	Embedded Processor with a PCI interface used on the IAPB board for real time acquisition and image processing control.
Push Button	A button that carries out an action. The button's appearance changes when it is pressed, and reverts back to its unpressed appearance when released. A Push Button typically has a label which describes its action. (same as Command Button)
QA	Quantitative Analysis
QID	Quad Image Display
RTD	Real-Time Disk.
R/F	Radiography / Fluorography
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory
RAMDAC	Random Access Memory Digital to Analog Converter

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ROI	Region of Interest
SCSI	Small Computer Systems Interconnect.
SDRAM	Synchronize Dynamic Random Access Memory
SID	Single Image Display
SID	Source to Image Distance
SIMM	Single Inline Memory Module
S/N	Serial Number
SRAM	Static RAM
SVGA	Super Video Graphics Adapter.
SW	Software.
UL	Underwriters Laboratory
µR	micro-rad
V	volt
VCR	Video Cassette Recorder
VGA	Video Graphic Adapter.
VxD	Windows Virtual Device Driver
W	watt
W	Window

***Merriam Webster Medical Dictionary**

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17.2. Generator exposure tables

Table 1 following shows mAs values resulting from preselected mA and ms values (3 point operation). This table also shows the range and interrelation of these loading factors. For example, if in AEC operation it is known that the preset backup mAs limit is 50 mAs and 100 mA is chosen for that technique, then the maximum length of exposure possible (at which time the backup mAs limit is reached) is 500 ms.
In the above example, read down the 100 mA column to the 50 mAs value. Then read across to the left side of the page to the 500 ms value, this will be the maximum time allowed for the stated conditions.

IEC 60601-2-7 requires that this information be provided in a form suitable to be displayed at a prominent location on or near the control console of the generator. To this end, it is possible to photocopied this table and place it in a suitable location as per local requirements.

Note:
65 kW Generators ***Maximum mA = 800***
80 kW Generators ***Maximum mA = 1000***

Note*:*

1) mA/TIME values are tube rating dependent. For certain tubes, some mA/TIME selections are not available at higher kV selections.

2) The maximum power output of these generators is 65kW or 80kW respectively. The generator software does not allow a kV and mA combination to be selected that exceeds this maximum value.

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TECHNIQUE SELECTION

(3 Point Selection: mA/TIME & mAs per IEC)

Time (ms)	mA Selected																
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400
1.0																	
1.2																	.5
1.6																.5	.63
2															.5	.63	.8
2.5														.5	.63	.8	1.0
3.2													.5	.63	.8	1.0	1.25
4												.5	.63	.8	1.0	1.25	1.6
5											.5	.63	.8	1.0	1.25	1.6	2.0
6.3										.5	.63	.8	1.0	1.25	1.6	2.0	2.5
8									.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2
10								.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0
12.5							.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0
16						.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3
20					.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0
25				.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10
32			.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5
40		.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16
50	.5	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20
63	.63	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25
80	.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32
100	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40
125	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50
160	1.6	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50	63
200	2.0	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50	63	80
250	2.5	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50	63	80	100
320	3.2	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50	63	80	100	125
400	4.0	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50	63	80	100	125	160
500	5.0	6.3	8.0	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200

Table 1 (cont): mAs values vs. mA & time selected

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Table 1 (cont.): mAs values vs. mA & time selected

Time (ms)	mA Selected																
	500	**630**	**800**	**1000**													
1.0	**.5**	**.63**	**.8**	**1.0**													
1.2	**.63**	**.8**	**1.0**	**1.2**													
1.6	**.8**	**1.0**	**1.2**	**1.6**													
2	**1.0**	**1.25**	**1.6**	**2.0**													
2.5	**1.25**	**1.6**	**2.0**	**2.5**													
3.2	**1.6**	**2.0**	**2.5**	**3.2**													
4	**2.0**	**2.5**	**3.2**	**4.0**													
5	**2.5**	**3.2**	**4.0**	**5.0**													
6.3	**3.2**	**4.0**	**5.0**	**6.3**													
8	**4.0**	**5.0**	**6.3**	**8.0**													
10	**5.0**	**6.3**	**8.0**	**10**													
12.5	**6.3**	**8.0**	**10**	**12.5**													
16	**8.0**	**10**	**12.5**	**16**													
20	**10**	**12.5**	**16**	**20**													
25	**12.5**	**16**	**20**	**25**													
32	**16**	**20**	**25**	**32**													
40	**20**	**25**	**32**	**40**													
50	**25**	**32**	**40**	**50**													
63	**32**	**40**	**50**	**63**													
80	**40**	**50**	**63**	**80**													
100	**50**	**63**	**80**	**100**													
125	**63**	**80**	**100**	**125**													
160	**80**	**100**	**125**	**160**													
200	**100**	**125**	**160**	**200**													
250	**125**	**160**	**200**	**250**													
320	**160**	**200**	**250**	**320**													
400	**200**	**250**	**320**	**400**													
500	**250**	**320**	**400**	**500**													

Table 1: mAs values vs. mA & time selected

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Table 1: mAs values vs. mA & time selected

Time (ms)	mA Selected																
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400
630	6.3	8.0	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250
800	8.0	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320
1000	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400
1250	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500
1600	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
2000	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800
2500	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800	1000
3200	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800	1000	
4000	40	50	63	80	100	125	160	200	250	320	400	500	630	800	1000		
5000	50	63	80	100	125	160	200	250	320	400	500	630	800	1000			
6300	63	80	100	125	160	200	250	320	400	500	630	800	1000				

Time (ms)	mA Selected																
	500	630	800	1000													
630	320	400	500	630													
800	400	500	630	800													
1000	500	630	800	1000													
1250	630	800	1000														
1600	800	1000															
2000	1000																
2500																	
3200																	
4000																	
5000																	
6300																	

Table 1 (Cont): mAs values vs. mA & time selected

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Notes:

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1. Precision Rxi System Mode of Operation

Revision History

Rev.	Date.	Reason for Change
01	August 2006	First release

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The Precision Rxi can run in the following operative mode:

N.	Mode of operation	Radiological Techniques	par. / page
1	Radiography on Spot Film Device (SFD)	AEC kV and mAs kV, mA e s	1.2/ 5
2	Rapid sequence on Spot Film Device (SFD)	AEC kV and mAs kV, mA e s	1.3 / 6
3	Digital Radiography	AEC kV and mAs kV, mA e s	1.4/ 7
4	Direct Radiography on patient tabletop and on a stretcher (table)	kV and mAs kV, mA e s	1.5 / 7
5	Radiography on wallstand (Table)	AEC kV and mAs kV, mA e s	1.6 / 8
6	Radiography on wallstand (on OTS)	AEC kV and mAs kV, mA e s	1.7 / 11
7	Radiography on stretcher done by using the ceiling suspension (OTS)	kV e mAs kV, mA e s	1.8 / 12
8	Digital Subtraction Angiography (DSA)	kV and mAs kV, mA and s	1.9 / 15
9	Rapid sequence of digital spot	AEC kV and mAs kV, mA and s	1.10 / 15
10	Tomography on cassette (SFD)	kV, mA	1.11 / 18
11	Digital tomography	kV, mA	1.12 / 18
12	Continuos fluoroscopy	ABS kV and mA	1.13 / 19
13	Pulsed fluoroscopy	ABS kV and mA	1.14 / 20
14	High Level Dose continuous fluroscopy HLF	ABS kV and mA	1.15 / 21
15	Cineloop	ABS kV and mA Continuous or pulsed fluoroscopy	1.16 / 22
16	Road Mapping	ABS kV and mA	1.17 / 25

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1.1. Radiographic and fluoroscopic techniques

1.1.1. Radiographic techniques and parameters that can be selected

The Precision RXi system runs with the following radiographic techniques :

1) AEC Technique (Automatic Exposure Control)

With this radiological technique the operator have to set manually the most suitable kV and mA values taking into consideration the examination that will be performed. The system by integrating the signal from the ionization camera (or from photo pick-up), will fix the X-ray exposition time.
This technique uses also some streamlines :

- definitions of the three different screen reinforcement levels from which it is possible to better find out the films reaction speed (only in case of spot on cassette);
- to reach the right density variation in order to adjust the AEC system and obtain radiography with different blackening value;
- three different dose levels for digital spots;
- a different dose level to be used for Digital Subtracted Angiography (DSA).

2) Two points technique (kV and mAs)

With this radiological technique the operator must set manually the most suitable kV and mAs values (values for exposition) taking into consideration the examination that will be performed. The system will adjust automatically the mA value and the X-ray exposition time so that the result of their product values will be exactly the same as the one previously set.

3) Three points technique or free technique (kV, mA and s)

In case of this radiological technique the operator must manually set all the radiological parameters values (kV, mA and s).

4) Anatomic programmer (APR)

The system will set automatically the most suitable previously stored radiographic and radiological parameter values by selecting the wished anatomic technique.

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1.1.2. Fluoroscopic technique and selectable parameters

This system can work with the following fluoroscopic techniques:

1) ABS Technique (Automatic Brightness System)

With this fluoroscopic technique the system, through the signal integration taken from a photo pick-up will automatically adjust the kV and mA values in order to obtain a fluoroscopic image with a good brightness.
This technique uses following refinement :

- three different ABS dose levels;

2) Manually technique (kV and mA)

With this fluoroscopic technique, the operator have to set manually the most suitable kV and mA values taking into consideration the examination in progress. The system will keep these values constant.

3) Anatomic programmer (APR)

The system will adjust the most suitable and previously set parameters automatically for both fluoroscopic and radiological technique, by selecting the wished anatomic technique.

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1.2. Radiography on Spot Film Device (SFD)

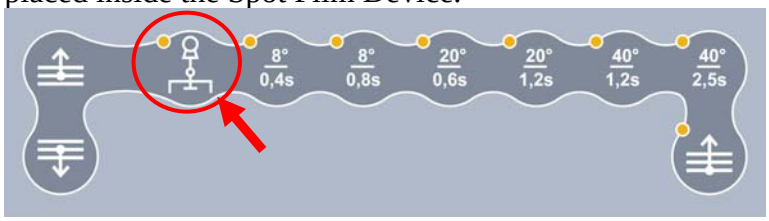
1.2.1. Operation Mode Selection

Radiography on Spot Film Device can be selected by pushing one of following buttons:

Spot Film Device (SFD) receptor button on integrated console;

or receptor button SFD on the touch screen;

In addition the tomography function on cassette must be disabled and the radiographic cassette is placed inside the Spot Film Device.



Tomographic push button deactivation.

The LEDs state show if this operation mode is activated .
This operation mode will stay activated until a new operation mode is selected.

1.2.2. Parameters and elements configurable

With this operation mode is possible to perform all the radiographic techniques explained in the above paragraph 1.1.1 at page 3.

- automatic and semiautomatic collimation;
- radiographic cassette section subdivision;
- opportunity to put in / take out the releasing anti-radiation grid;
- adjustment and compensation of focal distance;
- opportunity to make incidences oblique;
- right patient positioning .

1.2.3. Application examples

General-purpose modality adopted to perform examinations of any anatomic part on radiographic cassette optimizing film consumption in terms of surface occupied for every exposure.
The acquisitions with this modality are carried out placing the patient on the table top, moving the SFD under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate cassette subdivision and resulting collimation are chosen.

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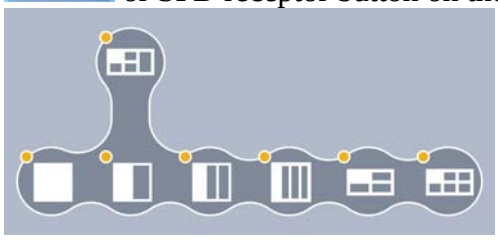
1.3. Rapid spot sequence on Spot Film Device (SFD)

1.3.1. Operation Mode Selection

Rapid spot sequence on Spot Film Device can be selected by pushing the following buttons :

Spot Film Device (SFD) Receptor button on integrated console;

or SFD receptor button on the touch screen;

 one of this possible cassette size divisions button

Rapid spot filming button;

In addition make sure that the tomographic function on cassette is disabled and the radiographic cassette is inside the Spot Film Device.

push this button in order to disable the tomography mode

The Table console Indicator LED states will show the operation mode activation.
This mode will remain activated until all the cassette sides not yet exposed will set to zero or a different mode will be selected.

1.3.2. Parameters and configurable elements

With this operation mode is possible to perform all the radiographic techniques explained in the paragraph 1.1.1 at page 3.

1.3.3. Application examples

This operation mode is recommended in order to make investigations when it is necessary to obtain quickly multiple images (up to 6) by means of radiographic cassette subdivisions.

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1.4. Digital spot

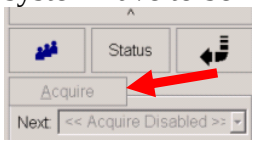
1.4.1. Operation Mode Selection

Digital spot operation mode is activated only with a digital system and can be selected by pushing the following button:

The Digital System selection button (DFR) on the integrated console;

or on the other hand, the DFR receptor on the touch screen;

In addition, the digital system must be switched on, connected, an exam must be opened and at last the system have to be in the acquisition mode.



The LEDs state, the touch screen receptor selection and the “Acquire” digital PC screen will show the operation mode activation.
This mode will remain activated till one different mode is selected or the digital PC acquisition mode is disabled.

1.4.2. Parameters and configurable elements

With this operation mode is possible to perform the radiographic techniques for digital systems explained in the paragraph 1.1.1 at page 3.

1.4.3. Application examples

General-purpose modality adopted to perform examinations of any anatomic part by means of II-TV system to acquire images to be managed by the digital system. The acquired digital images can be processed, stored and transferred to PACS network.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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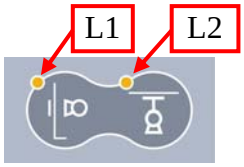
1.5. Direct radiography on patient tabletop or on a stretcher (table)

1.5.1. Operation Mode Selection

Direct radiography on patient tabletop or on a stretcher works by pushing the following button:

patient tabletop receptor button on the touch screen;



In addition the below conditions must be fulfilled:

1) LED L1 ON – when the X-ray tube is rotated and the beam is not perpendicular to the table.
   LED L1 OFF – when the X-ray tube is not rotated and the beam is perpendicular to the table.
2) no cassette must be inserted into the wallstand. If a cassette is inserted into the wallstand (LED L1 BLINKING) the X-rays are inhibited.
3) LED L2 must be OFF. This indicates the OTS is in its parked position.
4) If LED L2 is ON this indicates OTS is not in its parked position. In this situation movements of the table tube stand, elevation, tilting, tomography and focal distance will be inhibited to prevent a collision between the table and OTS.
   LED L2 must be OFF.

The table touch screen receptor button down pressure shows the operation mode activation, as a matter of fact this mode will stay activated until a new receptor is selected.

1.5.2. Parameters and configurable elements

This operation mode can be used only with the following radiographic techniques explained also in the paragraph 1.1.1 at page 3.

- Technique at two points (kV and mAs);
- Technique at three points or free technique (kV, mA and s);
- Anatomic programmer (APR);

1.5.3. Application examples

Modality adopted to perform examinations on table top without SFD on extremity (hand, foot) or directly on a patient placed on a stretcher.
The acquisitions with this modality are carried out in the following way.

a) Examination on table top without SFD
   A free radiographic cassette is placed on the table top and positioning the X-ray tube stand so as to obtain the wished projection.
b) Patient placed on a stretcher
   The table is placed in vertical position, the X-Ray tube is rotated manually in the +90° position and the X-ray tube stand is positioned at the desired height from floor. Than a radiographic cassette is placed under the patient and over the stretcher table top.

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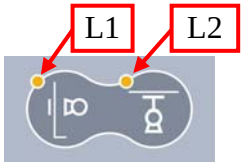
1.6. Radiography on Wallstand (with table)

1.6.1. Operation Mode Selection

Radiography on Wallstand (with table) is selected by pushing the following button :

Wallstand receptor button on the touch screen,

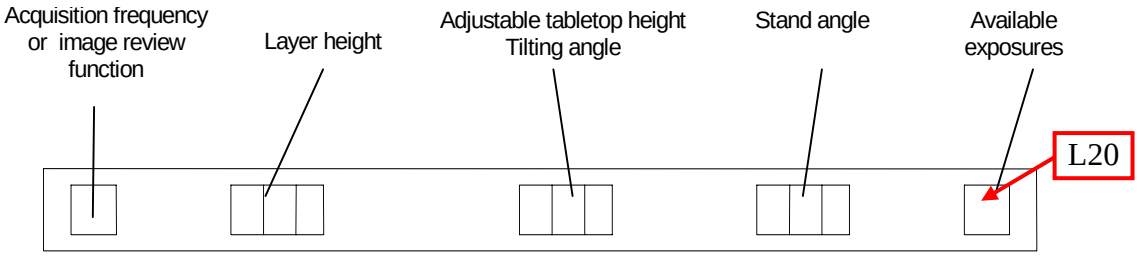


When the wallstand mode is selected following conditions can occur:

1) LED L1 ON – indicates the table is positioned to allow a radiography on the wallstand and there is a cassette in the wallstand bucky.
2) if the LED L1 is BLINKING this indicates that X-rays are inhibited for one of the following reasons:

- For a table with wallstand only system
  - The table is not rotated to 90°
  - The X ray housing is rotated
  - The cassette is not present in the wallstand bucky
  - The cassette in the bucky has already been exposed
- For a wallstand with manual collimation OTS system
  - The table X-ray tube is rotated
  - The cassette is not present in the wallstand bucky
  - The cassette present in the bucky has already been X ray exposed
- For a wallstand with automatic collimation OTS system
  - The table X-ray tube is rotated
  - The cassette is not present in the bucky
  - The cassette in the bucky has already been X ray exposed
  - The OTS is not aligned with the wallstand (make reference also to the operator manual)

3) LED L2 must be OFF. This indicates the OTS is in its parked position.



The console table display LED L20 will display 1 if the cassette is present in wallstand.
The console table display LED L20 will display 0 if the cassette present in the wallstand has already been exposed.
The console table display LED L20 will be OFF if no cassette is present in the wallstand.

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The Wallstand receptor button down pressure and the LEDs state on the Table console will show the operation mode activation, as a matter of fact this mode will stay activated until a new receptor is selected.

1.6.2. Parameters and configurable elements

This operation mode can be used for all the radiographic techniques explained in the paragraph 1.1.1 page 3.

1.6.3. Application examples

Modality adopted to perform examinations on a standing patient like chest by means of a wallstand paced laterally.
The acquisitions with this modality are carried with the table placed in horizontal position, the X-Ray tube rotated manually in the +90° position and the X-ray tube stand positioned at the desired distance from the wallstand. Than a radiographic cassette is placed in the bucky of the wallstand and the collimation is manually adjusted.

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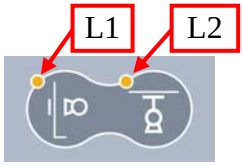
1.7. Radiography on wallstand (with OTS)

1.7.1. Operation Mode Selection

Radiography on wallstand (with OTS) is selected by pushing the following button:

wallstand receptor on touch screen,

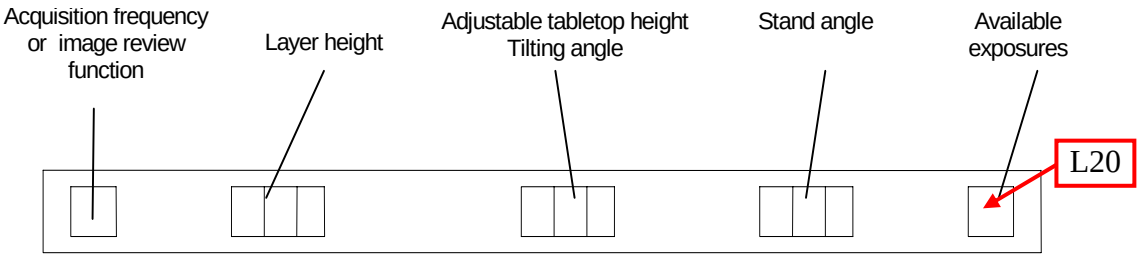


When the wallstand mode is selected following conditions can occur:

1) LED L1 LIT – indicates the OTS are positioned to allow a radiography on the wallstand and there is a cassette in the wallstand bucky.
2) if the LED L1 is BLINKING this indicates that X-rays are inhibited for one of the following reasons:

- For a wallstand with manual collimation OTS system
  The table X-ray tube is rotated
  The cassette is not present in the wallstand bucky
  The cassette present in the bucky has already been X ray exposed
- For a wallstand with automatic collimation OTS system
  The table X-ray tube is rotated
  The cassette is not present in the bucky
  The cassette in the bucky has already been X ray exposed
  The OTS is not aligned with the wallstand (make reference also to the operator manua)

3) LED L2 must be ON. This indicates OTS is not in its parked position. In this situation movements of the table tube stand, elevation, tilting, tomography and focal distance will be inhibited to prevent a collision between the table and OTS.



The console table display LED L20 will display 1 if the cassette is present in wallstand.
The console table display LED L20 will display 0 if the cassette present in the wallstand has already been exposed.
The console table display LED L20 will be OFF if no cassette is present in the wallstand.

The Wallstand receptor button down pressure and the LEDs state on Table console will show the operation mode activation, as a matter of fact this mode will stay activated until a new receptor is selected.

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Conditions of use for automatic collimation OTS and wallstand

1) When the focal distance is between 90cm - 205cm and the OTS tube is rotated towards the wallstand the collimator will enter automatic mode. In this mode X-rays can only be made at a focal distance of 100cm or 180cm; otherwise X-rays will be inhibited as indicated by LED (L1) blinking.

2) If the focal distance is outside 90cm – 205cm then the collimation will switch to manual.

Make reference to the paragraph 4.9 of the system Operator Manual.

1.7.2. Parameters and configurable elements

This operation mode can be used for all the radiographic techniques explained in the paragraph 1.1.1at page 3.

1.7.3. Application examples

Modality adopted to perform examinations on a patient by means of a wallstand and an OTS.
Several types of examinations can be executed with this configuration especially when the positioning of the patient is more simple and/or comfortable on wallstand than on the table.
The acquisitions with this modality are carried out placing the OTS at the desired FFD.
Than a radiographic cassette is placed in the bucky of the wallstand and the collimation on the OTS is adjusted (manually or automatically depending on the system configuration).

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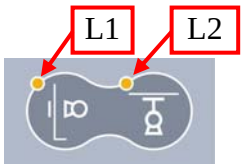
1.8. Radiography on stretcher done by using the ceiling suspension (OTS)

1.8.1. Operation Mode Selection

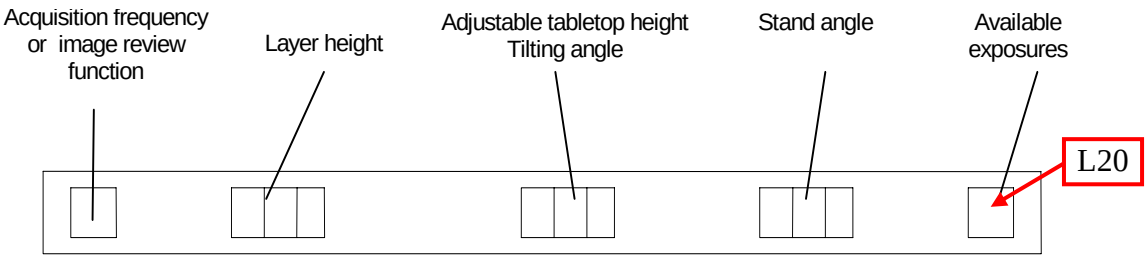
Radiography on wallstand (with OTS) is selected by pushing the following button:

the Overhead Tube Suspension receptor on the touch screen;



When the wallstand mode is selected following conditions can occur:

1) LED L1 must be OFF: the table X-ray tube beam is perpendicular to the table.
2) if LED L1 is BLINKING this means that a cassette is inserted into the wallstand. This indicates that X-rays are inhibited.
3) if LED L2 is OFF this indicates that the OTS is in its parked position.
4) LED L2 ON indicates OTS is not in its parked position. In this situation movements of the table tube stand, elevation, tilting, tomography and focal distance will be inhibited to prevent a collision between the table and OTS.



The console table display LED L20 will display 1 if the cassette is present in wallstand.
The console table display LED L20 will display 0 if the cassette present in the wallstand has already been exposed.
The console table display LED L20 will be OFF if no cassette is present in the wallstand.

1.8.2. Parameters and configurable elements

With this system operation mode it is only possible to use the below listed radiographic techniques which are also explained in the paragraph 1.1.1 at page 3.

- Technique at two points (kV e mAs);
- Technique at three points or free technique (kV, mA e s);
- Anatomic programmer (APR);

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1.8.3. Application examples

Modality adopted to perform examinations on a patient placed on a stretcher by means of an OTS and eventually a tilting wallstand.
The acquisitions with this modality are carried out in the following way.

a) Examination without wallstand
   OTS is placed over the stretcher at the desired FFD and a radiographic cassette is placed under the patient and over the stretcher table top.

b) Examination with wallstand
   In this case the stretcher and the tilting wallstand constitute a device able to carry out examinations placing the bucky of the wallstand under or laterally to the stretcher. Therefore the OTS is placed over the stretcher or opposite the wallstand at the desired FFD.
   Than a radiographic cassette is placed in the bucky of the wallstand and the collimation on the OTS is adjusted (manually or automatically depending on the system configuration).

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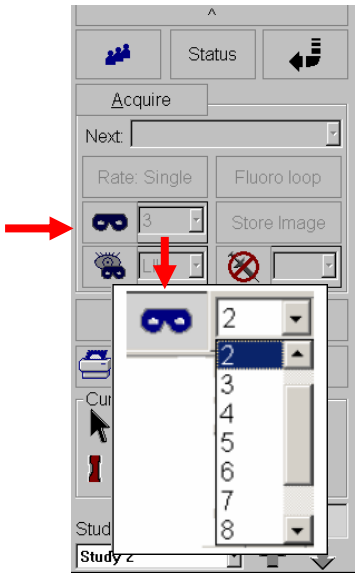
1.9. Digital Subtraction Angiography (DSA)

1.9.1. Operation Mode selection

Digital Subtraction Angiography (DSA) is activated only if there is a digital system whit the DSA option activated, you select this mode by pushing the “mask” button on the digital system:
You can select this mode only if an exam has been opened and the system is in acquisition mode, (the “Acquire” indicator on the digital PC is activated).

Make reference to chapter 6 of the System Operator Manual.



As soon as the digital PC “Mask” button is selected, DSA

indicator will be automatically set on the touch screen and in addition will be inhibited the receptor previously activated.

The “Mask” button and the receptor on the touch screen will show if this mode is activated. This mode will remain activated until the “Mask” button on digital PC will not been deactivated.

1.9.2. Parameters and configurable elements

This mode can use the radiographic technique for the Digital system described above in the paragraph 1.1.1 at page 3 .

1.9.3. Application examples

Digital Subtraction Angiography is the procedure to visualize blood vessels with contrast medium in a bony environment by subtracting the pre-contrast image (the mask) from the image with contrast medium.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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1.10. Rapid sequence of digital spot

1.10.1. Operation Mode Selection

Rapid sequence of digital spot can be activated only in case of a digital system, it is activated by selecting:

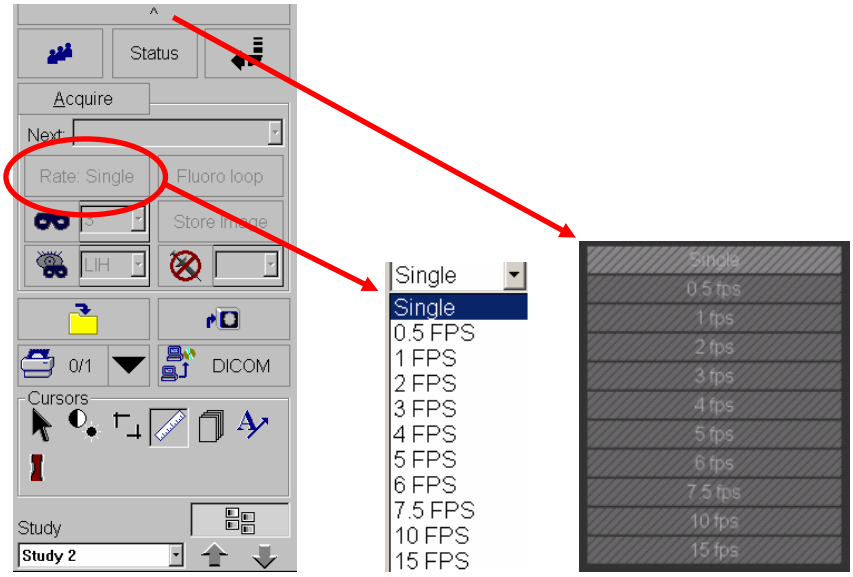
the digital push button (DFR) (Digital Fluoroscopy) on the integrated console;

or by pushing the DFR receptor on the touch screen ;

as a next step push the frame per a second button in order to acquire Images through one of the available Menu:

Warning: the push button is selectable only when the patient examination has been opened and the system is in acquisition mode ("Acquire" indicator on digital PC is activated).

Make reference to chapter 6 of the System Operator Manual .



The LEDs state on the console , the receptor down pressure on the touch screen, and the "Rate" (fps numbers) on the digital PC screen will show this activation mode.
This mode will stay activated until it will be set again with a rate of "single from digital PC"

1.10.2. Parameters and configurable elements

This mode can use radiographic technique for digital system described in the paragraph 1.1.1 at page 3

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1.10.3. Application examples

Modality recommended for investigations where is necessary to attain quickly multiple images by means of II-TV system to acquire images to be managed by the digital system. The acquired digital images can be processed, stored and transferred to PACS network.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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1.11. Tomography on cassette (SFD)

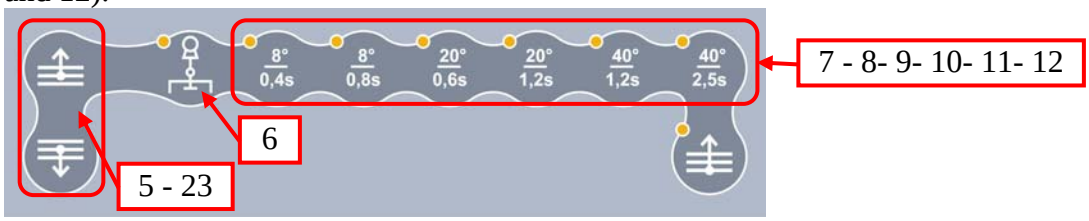
1.11.1. Operation Mode Selection

This working mode can be selected by pushing one of the following buttons:

The Spot Film Device receptor button (SFD) (Spot Film Device) on the integrated console;

or the button of the receptor SFD on the touch screen;

In addtion it is necessary to activate the tomography function on cassette (push buttons 7, 8, 9, 10, 11 and 12).



Tomographic function push buttons selection.

With push buttons 5 and 23 it is possible to set the layer height.

The console LEDs state will show the mode activation.
This mode will stay activated until a new mode will be selected or push button 6 is selected.

1.11.2. Parameters and configurable elements

This mode use following radiographic technique:

- kV, mA;

1.11.3. Application examples

Modality where the X-ray tube is moved from point "A" to point "B" above the patient, while the SFD moves simultaneously under the patient from point "B" to point "A." The fulcrum, or pivot point, is set to the area of interest. In this manner, the points above and below the focal plane are blurred out.
The acquisitions with this modality are carried out placing the patient on the table top, moving the SFD under the anatomic part to be examined. An appropriate angle, speed and layer height must be selected. Furthermore an appropriate cassette subdivision and resulting collimation must be chosen related to size and to typology of exam.

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1.12. Digital Tomography

Operation Mode Not Available

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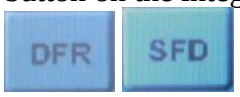
1.13. Continuous Fluoroscopy

1.13.1. Operation Mode Selection

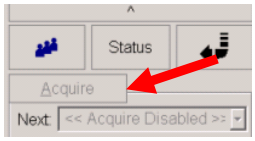
Continuous Fluoroscopy is selected by pushing following buttons:

the DFR push button (Digital Fluoroscopy) or the Spot Film Device (SFD) receptor button on the integrated console;



or the receptor button DFR or the SFD button on the touch screen;

WARNING: in case of digital system the fluoroscopy is allowed even if the digital system is not in acquisition mode. In order to use all this mode functionality it is very important to open one exam and set the system to acquisition mode.



in case of analogical system the fluoroscopy mode is always enabled.

In addition, in order to activate the fluoroscopy mode it is necessary to deactivate the selection button of the pulsed fluoroscopy mode.

The LEDs state, the console button pressure, the receptor touch screen pressure and the “Acquire” indicator on the digital PC touch screen will indicate if this mode is activated.

1.13.2. Parameters and configurable elements

This mode can use all the fluoroscopy technique described at the paragraph 1.1.2 at page 4.

1.13.3. Application examples

General-purpose modality adopted to perform examinations of any anatomic part by means of II-TV system to acquire images to be managed by the digital system. The acquired digital images can be processed, stored and transferred to PACS network.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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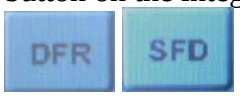
1.14. Pulsed fluoroscopy

1.14.1. Mode selection

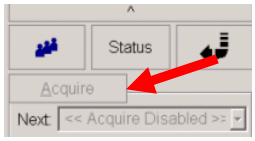
Pulsed fluoroscopy operation mode is selected by pushing the following button :

the DFR push button (Digital Fluoroscopy) or the Spot Film Device (SFD) receptor button on the integrated console;



or the receptor button DFR or the SFD button on the touch screen;

Warning: in case of digital system the fluoroscopy is allowed even if the digital system is not in acquisition mode. In order to use all this mode functionality it is very important to open one patient examination and set the system to acquisition mode.



This button allowed the selection of fluoroscopy mode. Once fluoroscopy mode is activated it is possible to set the desiderated number of X-ray pulse per a second.

WARNING: in case of 512 analogical system, the pulsed fluoroscopy in NOT available

The console **LEDs** state, the down pressure receptor on the touch screen (and the "Acquire" function on the digital PC touch screen) will show if this mode is activated. In order not to operate in this operation mode, deactivate "pulsed fluoroscopy" button.

1.14.2. Parameters and configurable elements

This mode can use all the fluoroscopic technique described in the paragraph 1.1.2 at page 4.

1.14.3. Application examples

General-purpose modality adopted to perform examinations of any anatomic part by means of II-TV system to acquire analogical or digital images.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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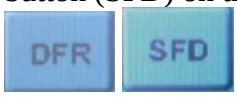
1.15. Continuous Fluoroscopy at high dose (HLF)

1.15.1. Mode selection

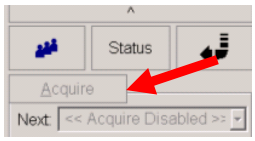
Continuous Fluoroscopy at high dose is selectable by pushing following buttons:

the selection button DFR (Digital Fluoroscopy) or the Spot Film Device receptor button (SFD) on the integrated console;



or the DFR receptor button or the SFD receptor on the touch screen;

Warning: in case of digital system the fluoroscopy is allowed even if the digital system is not in acquisition mode. In order to use all this mode functionality it is very important to open one exam and set the system to acquisition mode.



Furthermore, to activate the fluoroscopy mode at high dose level, it is necessary to activate the HLF button.

Warning: the HLF button can not be activated if pulsed fluoroscopy is selectable.

The console LEDs state, the receptor down pressure on the touch screen (and “Acquire” indicator on digital PC) will show if this mode is activated.
In order to deactivate this mode deactivate the HLF button.

1.15.2. Parameters and configurable elements

This mode can use all the fluoroscopic techniques described to paragraph 1.1.2 at page 4.

1.15.3. Application example

General-purpose modality adopted to perform examinations of any anatomic part by means of II-TV system to acquire analogical or digital images.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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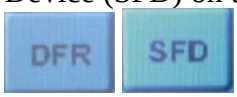
1.16. Cineloop (fluoro loop)

1.16.1. Operation Mode Selection

The Cineloop (fluoro loop) mode allows to acquire and store a sequence of images (with different values for images number to be acquired per second).

This mode can be selected by pushing the following buttons:

the DFR (Digital Fluoroscopy) selection button or the receptor button on Spot Film Device (SFD) on the integrated console;



or the receptor button DFR or the receptor SFD on the touch screen ;

To activate the feature, click the Fluoro Loop button on the Standard Control Box on the Main Image screen.

To store the current Fluoro Loop to the database, click on the Store Loop button at the Main Image screen.
Alternately, using the In-Room Controls, while live Fluoro images are being displayed on the Monitor, press the button that is interfaced to the Imaging system.
Images will be stored to the local database at the selected acquisition rate for as long as the button is held.

(Make reference to chapter 6 of the System Operator Manual)

Warning: this button can be selected only if an exam has been opened and the system is in acquisition mode (the “Acquire” indicator on the digital screen PC is selected).

WARNING: for 1kx1k analogic system, the cineloop mode is activated by pushing following buttons:**.**

the images store speed can change from 12, 6, 3, 1, images/s (make reference to chapter 17 of the System Operator Manual).

as soon as this button is pushed the images stored function will start

WARNING: for 512 analogical system, the cineloop mode IS NOT AVAILABLE .

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1.16.2. Parameters and configurable elements

This mode can use all the fluoroscopic techniques described at paragraph 1.1.2 at page 4.

1.16.3. Application Examples

General-purpose modality adopted to perform examinations of any anatomic part by means of II-TV system to acquire digital images.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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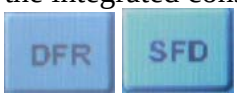
1.17. Road Mapping

1.17.1. Operation Mode Selection

Roadmapping is an acquisition mode where the system subtracts one image from subsequently acquired images. Only the difference between the format and each of the newly acquired images is shown.
This functioning mode is available only in case of digital system and if it is selectable by pushing following buttons:

the DFR selector button (Digital Fluoroscopy) or the Spot Film Device receptor on the integrated console;

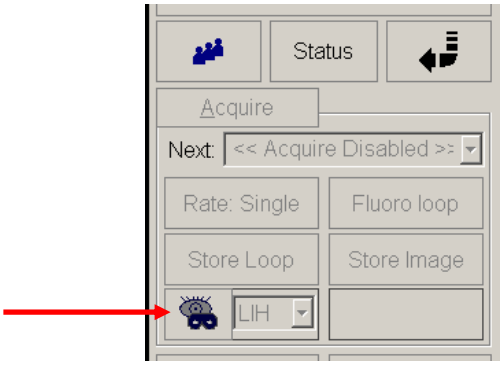


or the DFR receptor or the push button receptor SFD on the touch screen ;

the “Mask” push button sup PC digital.

Warning: the “Mask” button is selectable only if one patient examination is opened and the system is in acquisition mode, (the “Acquire” indicator on the digital PC screen is activated).

1 Left click on the Mask button.
2 The text within the dialog box will “light up” (change from gray to white).



There are three ways of selecting the image to be used as the mask image.

- Using the Last Image Held on the screen (LIH)
- Max Opacification
- Minimum Opacification

For further information please make reference to System Operator Manual at chapter 6

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1.17.2. Parameters and configurable elements

This operation mode can use the fluoroscopic technique for digital system described to paragraph 1.1.1at page 3.

1.17.3. Application examples

Fluoroscopic image of contrast medium filled vessels used as guidance during catheter manipulations. The technique of "road-mapping" makes use of an iodinated mask to provide visualization of the vessel lumen during catheter advancement and interventional procedures. The mask is acquired during a low-volume intra-arterial or intravenous injection, so that the mask contains an opacified image of this vessel. Real-time fluoroscopic subtractions of non-opacified images are then formed in which background anatomy is removed, but a fixed image of the originally opacified vessel remains. As the catheter is manipulated, its movement is visualized within the image of the opacified vessel.
The acquisitions with this modality are carried out placing the patient on the table top, moving the II-TV system (jointly with SFD) under the anatomic part to be examined and positioning the X-ray tube stand so as to obtain the wished projection. Related to size and to typology of exam an appropriate zoom setting and resulting collimation are chosen.

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